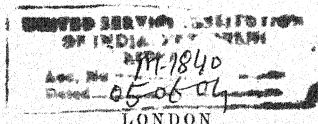


THE
INFANTRY WEAPON
AND
ITS USE IN WAR

BY
LIEUT.-COLONEL C. B. MAYNE, R.E.

"'Tis a thradition in th' British Ar-muy that War is
bein' shot at. That's wrong. War is shootin' at the
other fellow."—MR. DOOLEY.



SMITH, ELDER & CO., 15, WATERLOO PLACE

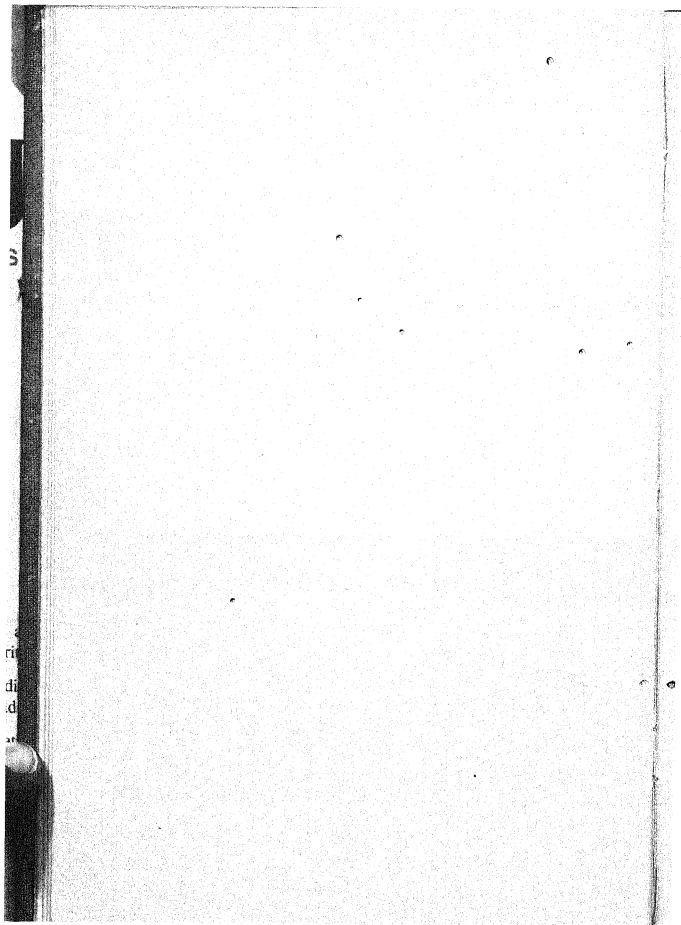
1903

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DEDICATED
TO
THE INCOMPARABLE INFANTRY
OF THE
BRITISH EMPIRE

"For indomitable courage, uncomplaining fortitude, and implicit obedience, they are beyond criticism."—*Extract from the Official Report of the United States Military Attaché with the British Army in South Africa.*



AUTHOR'S NOTE

THE manuscript of the following pages was sent home in December, 1901, for publication, but delays arising from my being in India have prevented its earlier issue. Since the book was written, *Infantry Training* (Provisional), 1902, *Combined Training* (Provisional), 1902, and the *Musketry Regulations* (Provisional), 1903, have been issued. However, no changes have been made in the original text of the book, but some additions have been made in the form of footnotes.

This book has been written in response to the numerous requests that have been received at various times and from various quarters for a revision of my book on *Infantry Fire Tactics*. But, while correcting the proof-sheets, it has occurred to me that I have not laid sufficient stress on the necessity for a close and continuous co-operation of the artillery and infantry arms in battle, since, especially nowadays, each arm requires the assistance of the other arm to enable it to do its work of giving assistance to this other arm. The reader should bear this in mind while perusing these pages.

My work on *Infantry Fire Tactics* was first published in 1884, and an enlarged and revised edition was issued in 1888, nearly fifteen years ago. The book dealt with the use of the single-loading Martini-Henry rifle, with its large-bore bullet, relatively high trajectory, and smoky-powder ammunition; and its primary purpose was to plead for the introduction into our Regulations of many important usages and methods of firing that were necessary for ensuring the proper use of that particular rifle in war. The whole of these usages and methods have since then been adopted for some time past, but the large-bore, single-loading, high-trajectory Martini-Henry rifle, with its black-powder ammunition, has now been superseded by a small-bore, flat-trajectory rifle, with magazine attachment and smokeless-powder ammunition. Consequently, *Infantry Fire Tactics* is now practically out of date in many respects, though it has done its work.

In publishing the present work I have taken up the subject of infantry fire on more general lines than I did in my former book, and I am hopeful that it may prove equally useful to our Army. Our campaigns in the Tirah and South Africa have brought many special features to the forefront in connection with the use of the modern rifle in the field. But it seems to me that the exceptional character of these wars has not been fully separated by many writers from the somewhat novel accidental experiences that our troops gained in them, and consequently that there

is, with such writers, a strong tendency to form imperfect and one-sided views on the future use of the rifle from the want of a proper analysis of our experiences, separating their accidents from their substance. It will be seen that I have endeavoured to combat this tendency by making the necessary analyses where needed.

In such very important matters as the employment of the various arms of the service in the field, I would plead for the official encouragement of the freest and fullest expression of individual professional opinion on all technical matters relating to the Army, *provided that the existing Regulations are, in the mean time, complied with so long as they are in force.* This is a most important and vital matter for the future of our Army, and all the more so with us on account of the undoubted want of touch that exists between our staff and regimental officers. Field-Marshal Earl Roberts, General Sir Redvers Buller, and others have again and again spoken out clearly and strongly about the need that exists for all ranks to think and to be ready to act on their own initiative. But these words of theirs need not ever have been spoken if, in the past, all ranks had been allowed to think and make use of an intelligent initiative. But they were not allowed to do this, and in these respects the Boer War has proved to be a veritable nemesis for the errors that have been forced on regimental officers in the past, and about which they were not permitted to express their views.

However, personal thinking and the individual initiation of action can only be secured by encouraging men to think and speak and act, under due and liberal control. The best way in which this can be done is by the formal institution of garrison lectures, under the presidency of the officer commanding, as have been ordered to be given at all stations in India, and which should be done elsewhere as well.

But besides *knowledge* there is needed *will-power* to put it into action, and opportunity to put it into *practice*. Knowledge can be acquired by reading, study, and discussion. And no doubt there are many officers who know what to do under certain circumstances, but who fail in will-power to carry it out. This will-power can be cultivated, or entirely obliterated, by the way in which officers and men are trained in peace time, and it is far better for them to make mistakes—for all learners *must* make mistakes—provided they had some reason for what they did, than for no action to be taken at all for fear of making a mistake.* The fear of blame, and the consequent unwillingness to accept responsibility, has had largely to do with the want of initiative in our Army. We want in the future both a frank expression of military thought and opinion, and also a generous recognition of the educational value of mistakes made during training.

* See *Infantry Training*, section 212 (4).

In the following pages I have freely expressed my views against the tendency with many writers towards placing undue reliance both on long-range rifle-fire and on indiscriminate *independent* individual firing, pointing out, while doing so, that the proper reply to the long-ranging power of the modern rifle is a better and more powerful and numerous artillery, as has now been provided since the Boer War closed, and that the choice of the objectives of all firing, whether of infantry or artillery, should be strictly confined to carrying forward the general and local tactical intentions of the leaders, because *independency* of any kind is the last thing to be desired in any fighting. I have also endeavoured to point out the conditions under which the rifle has to be used in modern fighting, and the things that have to be considered, and the methods that have to be adopted, to assure, as far as possible, an efficacious fire under those conditions.

Appendix I. was written for the first number of *The Sapper*, a paper published for the Non-Commissioned Officers and men of the Corps of Royal Engineers.

Appendix II. gives the results of my investigations on certain subjects relating to Infantry Fire, and which are of practical importance under certain conditions.

Appendix III. gives an interesting account of the progress, initiated by Earl Roberts, that has been

made in practical musketry training in India, and of the way in which it was carried out. It explains how it was, with the advantages obtainable in India, that the Indian Musketry Regulations were, for so many years, far ahead of the British Musketry Regulations.

Appendix IV. shows how earnestly the subject of field-training is dealt with by the German Army, the chief exponent, perhaps, of the principle of the offensive in both movement and fire.

In the present book I have omitted a number of details which were required for such a pioneer work as *Infantry Fire Tactics*. Those who wish to examine these details are referred to this earlier work, which can be found in most military libraries.

I cannot conclude without expressing my indebtedness to the various writers of the many published books on the Boer War, to many officers for the personal experiences and information that they have given to me, to the *Times* for the valuable information it has given on the war, and to the numerous excellent articles published in *The Pioneer* of India on many varied subjects relating to the Army and to the Boer War.

C. B. MAYNE,

1908.

LIEUT.-COLONEL, R.E.

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THE INFANTRY WEAPON

AND

ITS USE IN WAR

CHAPTER I

PRELIMINARY CONSIDERATIONS

WAR is nothing but the application of compelling force in order to ultimately secure a particular political end that is considered to be of national importance. This applied force is a very complex thing, being composed of many varied elements—political, civil, administrative, financial, commercial, marine, naval, military, etc. These force-elements, or means of applying persuasive force, are therefore material, intellectual, and moral in character—the material giving power to act; the intellectual, skill to act; and the moral, determination to act: and they are so bound up together into an organic whole or unity that they mutually affect one another to a very considerable degree. Every nation makes, or should make, the utmost use that it can of all the force-elements that it

possesses, each in its proper place, time, proportion, and relation, in order to promote the success of its own cause. But, in the long run, national independence rests on a sufficiency of naval and military power to resist outside compulsion. Consequently civilized nations deliberately organize, equip, and train their naval and military force-elements in order to be able to apply them with the utmost efficacy possible when occasion arises.

Strategy is the art (1) of bringing together, at the right time and at the right place on the theatre of war determined by statesmen, every possible available means for applying a compelling force superior to that which the enemy is able to bring together locally to resist it, and (2) of making such an effective use of them as will annihilate the enemy's means and power of local resistance. Similarly *Tactics* is the art (1) of bringing together, at the right time and at the right place on the battle-field determined by strategy, every possible available means for applying a compelling force superior to that which the enemy is able to bring together locally to resist it, and (2) of making such an effective use of them as will annihilate the enemy's means and power of local resistance.

Thus, generally speaking, the aim of both strategy and tactics is the same—namely, the annihilation of the enemy's means of applying force by the aid of locally superior similar means—though their respective areas of operation and detailed modes of procedure are vastly

different in each case. Strategy is the art of bringing about battles with the greatest chance of victory; tactics is the art of fighting battles with the greatest chance of victory. Hence a good strategy may exist with bad tactics. But the effects of the best strategy are likely to be ruined by bad tactics causing the loss of battles, while the effects of the worst strategy may, to some extent, be redeemed by good tactics causing the gain of battles. Consequently *perfection* of tactics is of far greater relative importance than *perfection* of strategy, though good strategy may often, to some extent, redeem the effects of bad tactics; but as good strategy and good tactics react on each other beneficially to produce results that are often decisive from the outset of a war, we should invariably endeavour to aim at obtaining both. However, strategy lies in the province of the statesmen and generals of a country; while tactics lies in the province of the generals and their troops. Hence, for the foregoing reasons, tactics have a peculiar claim on the attention of every officer, though, at the same time, no officer should altogether neglect the study of strategy, or else he will neither understand what is being done, nor have an intelligent conception of his place and *rôle* in the great drama of war.

The moral and intellectual force-elements of both strategy and tactics possess a commanding influence over their respective material force-elements. The moral elements particularly have a special predominance, but as all these three kinds of elements are in intimate

organic relationship with each other, and so cannot help reacting on one another for good or evil, it is necessary to strive to arrive at the highest excellence in each. But, for the present, we only desire to draw attention, in a general way, to the material force-elements made use of in tactical operations. These force-applying means are (1) thrown projectiles, (2) hand-weapons used with skill, and (3) brute force used, when possible, with rapidity. Infantry and cavalry use all three of these means, though infantry have hitherto laid most stress on throwing projectiles, and cavalry, until quite lately, on rapidly and judiciously applied brute force combined with a skilful use of hand-weapons. Artillery only makes use of projectile-throwing, its projectiles being purposely made more powerful in effect, and longer ranging, than those used by either infantry or cavalry.

The skilful utilization of hand-weapons and brute force has been a stationary art for many long years past now, but a vast progress has been made, and is being made, in the art of throwing projectiles in order to intimidate an enemy into submission. This progress has brought about great changes in the relative value of projectile-throwing as compared with the other two material means of applying compelling force. The Boer War has shown us that the greatly increased efficacy of the modern weapons used for throwing projectiles has, for the moment, made them the most efficient means now available for applying material

force in the majority of cases. However, *even a hundred years ago* it was a recognized axiom that hand-weapons and brute force could only overcome the firearm when such conditions obtained as prevented the effective use of the latter, *e.g.* when the men using them had been either first demoralized, or surprised, or had used up their projectiles. *This primary condition is still necessary* with the improved firearms in use, though many seem to think that they have discovered it as a new lesson of the Boer War. But, at the same time, we must remember that projectile-throwing is primarily a means for producing preparatory intimidation and nervous fright only, and not for producing a decision. The only real means of obtaining a final decision is a rapid advance in mass for the deliberate purpose of closing on the enemy in order to apply hand-weapons and brute force on him. Projectile-throwing only prepares the way for this. This principle is a universal one that has always obtained in all the past ages. So long as one side is throwing projectiles from a distance, their opponents do not feel any necessity for immediate retreat; but this feeling, if not maintained by discipline or other moral and intellectual means, is apt to evaporate when the enemy closes on them in mass. Thus, while skilful projectile-throwing only weakens the enemy's powers of resistance, the successful use of hand-weapons and brute force crushes and destroys him if he waits to meet them. Consequently, in every decisive battle, we must ever seek for the best methods

for ensuring effectively the final decisive application of brute force and hand-weapons under the existing improved conditions of projectile-throwing. This problem involves the relation of the infantry and artillery projectile-throwing weapons to tactical principles and methods of procedure. And in the following pages we shall endeavour to indicate this relation so far as the infantry weapon only is concerned, under the governing strategical and tactical ideas that should dominate every battle from the outset to the finish. A dominating tactical idea was unfortunately absent in most of our battles in South Africa, as has been pointed out by the Austrian Field-Marshal Ratzenhoper,* and this serious omission, combined with faulty strategy, had its corresponding effect, not only of making victory harder to gain, but also of causing it to be gained with greater losses than necessary, and with only the bare result of mere gain of ground. In almost every one of our earlier battles the whole line of battle endeavoured to slog its way through the opposing line in front. There was little or no "organization of the battle-field," on which so much stress is rightly laid by foreign military writers, as a universal principle for ensuring, as far as possible, success in battle by means of order and unity of command. The same principle can be, and should be, also applied strategically to the whole theatre of war.

* *Journal of the Royal United Service Institution* for January, 1901. See also *Combined Training*, 1902, section 11 (1).

All fighting is either offensive or defensive, or demonstrative in character. The demonstrative or holding attack has for its object the deception of the enemy, and thus to keep him stationary in position, while the real attack is being made elsewhere; it can be used either by the attackers or by the defenders to deceive their opponents as to whether the true attack or defence is being there made.* The advantages of the offensive are chiefly moral, and those of the defensive chiefly material. And as the moral elements of war are by far the most important, every well-trained army seeks to act offensively, even when compelled by circumstances to act for a while on the defensive. The pure defensive can only procure negative results, *e.g.* the denial of victory to the enemy. Victory can only be secured by offensive actions, and consequently every defence, aiming at victory, must look upon its initial defensive attitude as only a temporary one that will be changed into the offensive as soon as circumstances admit of this being done with any chance of success. That is, every defence, looking for victory, must take up an attitude of delayed offence.

The offensive means forward movement, exposure, guessed ranges, and badly seen or even invisible targets to fire at. The defensive means stationary troops, concealed from view, and visible targets to fire at; it probably also includes a knowledge of the ranges. But

* The defensive makes use of it by taking up "false positions," wherever the ground permits of this being done.

the offensive includes the power of choosing the time and place of energetic action, as well as the laying down of the law to the enemy, and these advantages are so great that every effort should be made to act offensively, while employing such methods of action as will tend to minimize the material advantages of the opposing defence. But the duration of modern battles* will cause such a severe strain on the powers of endurance of the troops engaged, that we must expect to find these troops alternately adopting offensive and defensive attitudes along the whole front of battle. In many of the fights in South Africa our troops were from ten to fourteen hours in the firing-line, while at Spion Kop the same troops were for nearly three whole days and nights in the firing-line without relief.

Coming now to the organization of the battle-field, we have, in an offensive fight, to distinguish between the *holding, or engaging, or demonstrating attack* along the whole front and the *decisive assault* on some portion of this front, the flank for preference, by more or less fresh troops. These two parts of a battle should not be independent activities; they should always be most intimately connected with one another. The attack on the major portion of the front not to be assaulted is more or less demonstrative, in order to deceive the enemy as long as possible as to where the assault is to be ultimately delivered, and thus to keep his reserves tied down.

* See *Combined Training*, 1902, sections 8 (2) and 11 (3).

A strong distinction has to be made between the attack on *a defensive position hastily taken up* and the attack on *a defensive position carefully chosen and prepared* with the view of increasing its defensive capabilities. We will deal with the former case first.

The German Army is probably the principal advocate of the advantages of the offensive, and they strongly assert that the principal elements of the offensive are rapid movement in advance, energy of action, and surprise. But the Germans, undoubtedly, have also by far the greatest experience of any nation in the possible effects of artillery and rifle fire under field conditions, on account of the extraordinary advantages that they possess for war training in peace time (see Appendix IV.). And they fully admit that every assault against an unshaken enemy is bound to fail before the formidable fire-effects of the defensive, and that it is only by the destructive action of its own artillery and rifle fire that the attack must endeavour to produce on the defensive the demoralization, disorder, and loss that is the necessary preliminary for ultimate success.

The general idea for the battle is decided by the commander of the force, who determines where he will act defensively, where demonstratively, and where decisively. These decisions should be communicated to the subordinate leaders, so that all may know what part they have to play during the contest, and how they can best act in case of the unexpected happening, when new orders cannot be given in time.

The theory of battle as practised in Germany, in imitation of the Napoleonic method, consists in producing "an event" or decisive moral crisis at a given locality of the battle front and at a given moment. But to enable this decisive moral crisis to bring about the results expected from it, it must be preceded by a demonstrative action having for its object to feel for the enemy, to force him to show his dispositions, to use up his physical and moral forces, and to induce him to engage his reserves prematurely; or, in other words, to make him to so weaken himself, materially and morally, as to render him incapable of successfully resisting a vigorous and sudden blow struck at some locality with fresh troops. This blow should accordingly be characterized by the factors of surprise, short duration, and fierce, headlong offensiveness. Its purpose is to complete a demoralization that has been begun, and nearly brought to a head, by the earlier and preparatory fire-fighting.

Now, while the rifle is to assist the advance, the method of advance should also assist the rifle in producing good effects. Tactics include the right movement of the men as well as the right use of their rifles.* The object of all tactical procedure is the destruction of the enemy's means of injury and resistance; and, on the battle-field, we should endeavour to attain this object by holding the enemy everywhere by vigorously menacing his whole front, and then at the

* See page 270 on the connection between drill and firing.

proper time to strike at the chosen place (preferably one of the enemy's flanks) such a rapid and decisive blow as will determine the victory. This double aim necessitates the division of the attacking force into two groups—one charged with the preparatory engaging and demoralizing attack, and the other with the final decisive and smashing assault. In Germany, of late years, the former portion has been made as small as possible and the latter as strong as possible; in some cases, in the German manoeuvres, one division has made the frontal attack, while three divisions carried out the decisive assault on a flank!* Along the front of the engaging attack, the principal element for success lies, according to German teaching, in the superiority of fire obtained by the sudden and simultaneous linear deployments of masses of artillery and infantry, and in the effect produced by impressing a violent character on the fight from its outset, in order to surprise and check the enemy, and to deceive them as to the strength of the force in front of them. This, of course, demands careful reconnaissance† and great circumspection in correctly carrying out the early movements of the troops so as to avoid sending them forward in a false direction. And when these preliminaries have been effected, under the protection of an advanced-guard action, and the artillery preparation has progressed sufficiently, the Germans endeavour to carry

* See also *The Armed Nation*, by Von der Goltz.

† See *Combined Training*, 1902, section 10.

out the deployment of their infantry, told off for the holding attack, with the utmost rapidity (by arranging for their arrival in numerous parallel marching columns), and then, after this, to obtain a superiority of rifle-fire by putting as many rifles as possible into the firing-line when the really effective range of about 800 yards from the enemy is reached. The advance is expected to be made as rapidly as possible, without stopping, to such a position as will enable an effective fire to be made for the remainder of the fire-fight without the necessity for any materially great further forward movement. This fire position should be not further than 600 yards from the enemy, but it should not be so close as to so unduly compromise the firing-line as to prevent its withdrawal, if necessary; and by the violence of the fire, opened from this position, the Germans hope to rapidly bring about the decisive moral crisis or event that will enable the decisive assault to be successfully undertaken, with the co-operation of a violent concentrated fire of all the artillery that can also be brought to bear on the locality to be assaulted.

How far the Germans may modify their present ideal of a rapidly executed *violent* offensive in view of our experience in the Boer War cannot be foretold, though the German military press is already debating the need for more cautious tactical procedures under fire than in the past. But there is no doubt, from their Regulations, that the dominant principle of German tactics is to endeavour strenuously to acquire and

maintain the superiority of artillery and infantry fire from the very commencement of their respective activities, and to effect this at the shortest ranges possible. General Von der Goltz writes—

“The first necessity is superiority in the artillery duel ; for without this factor the infantry assault will rarely be crowned with success. But it will be *always* necessary to obtain, at the decisive point, a superiority of infantry fire. Whichever side nowadays knows how best to make use of this terrible torrent of fire according as it desires, will have the greatest chance of success.”

Speaking of infantry fire, the German Regulations say—

“The infantry fight is generally decided by a fire which reaches its maximum effect in the dispersed order ; infantry can, by its fire, drive the enemy back, prepare its own attack, and even at times bring about an immediate decision. In the majority of cases, the concentration of a violent fire, at short range, and on the important points, will produce such a result that the final assault will only find the hostile position either feebly defended or even abandoned by the enemy. In the fighting of infantry against infantry, success depends, independently of the moral factors, on the superiority acquired by the concentration of the fire of the extended lines on the decisive points. Success belongs at the outset to whichever of the two adversaries possesses the best instruction in firing, the severest fire discipline, the best managed direction of it.”

As regards the assault, the German Regulations say—

“The assault cannot succeed unless the superiority of fire is first secured. Strong groups of skirmishers advance towards the enemy’s position, and seek to dominate his fire; they are naturally taken from the units who are to execute the assault. When these skirmishers have arrived at a short distance from the position, the supporting troops ought to keep as near at hand as possible, ready to enter into line. As long as the superiority of fire is not gained, or the enemy does not appear to be seriously shaken, the execution of the assault is only possible at the price of great losses. Consequently time must be allowed for the fire to have effect before proceeding to the final shock.”

Elsewhere, when dealing with the first line of the decisive assault, and with the vigour with which the latter should be carried out, the German Regulations say—

“If a decisive fight has to be carried out, there must be no hesitation, as soon as an estimate has been made of the troops required for its execution, to deploy them in the most favourable formation for the concentration of their efforts. There is no greater fault than to engage insufficient forces with the idea of adding to them by degrees. This would be to fight successively with inferior forces against superior forces, and to voluntarily renounce the advantages of greater numbers. Every combat aiming at decisive results must have all the front available for deployment covered with a thick line of skirmishers.”

General Bronsart Von Schellendorf, at one time the German War Minister, writes—

"When it is necessary to act in a decisive manner, we can never put enough rifles in line at one time, because it is necessary to give the fire of the skirmishing line its maximum intensity and to maintain it. In every decisive combat, whether offensive or defensive, there is a phase in which the deployment of the greatest possible number of skirmishers, on the space to be covered, is an imperious necessity. Whoever refuses to recognize this truth deprives himself voluntarily of a chance of success. The distance up to which the combat of decisive fire ought to be taken may, if the particular configuration of the ground does not admit of a nearer approach, be extended at about 350 yards. At this distance the effects of a good instruction in firing will assuredly affirm itself."

These extracts have been given to show the consequences of the views of the extreme advocates of the offensive; and these consequences may be summed up as follows: rapidity of advance, and superiority of fire at short range by the use of a dense line of skirmishers, kept in hand by a strong and rigid fire discipline. We have not dealt with the execution of the assault, as that subject lies beyond our present purpose. The Germans are not likely either to meet such an exceptional foe as the Boers, or to fight in such an exceptional country as South Africa. Consequently, they may not feel disposed to make any material alteration in their present regulations. But it is interesting to see how closely they associate the use of the rifles with the movements of the troops, their reliance on the short-range infantry fire of a dense line of skirmishers to

assist in effecting the demoralization of the enemy, and their desire to impart a moral character of violence into both the employment of the rifle and the movement of their advancing troops. And we must also take note of the stress laid on good musketry training, severe fire discipline, good fire direction, and the concentration of the fire of many rifles on decisive points. The Germans strongly assert that the tactics of to-day should lead to the development on wide fronts of powerful firing-lines possessed of unity of direction, and simultaneousness of action, while making a skilful use of the power of their fire and of the ground; and they consider that the power of such a fire is equivalent to the action of masses. Consequently, the German infantry tactics of to-day may be summarized in the single expression—fire-power.

The tactical procedure that we have so far dealt with could only succeed in the case when the opposing forces meet each other on the march, and proceed at once to advance against one another, until one side is reduced to the defensive, while the other attacks without delay. But if one side gives up the offensive before contact is made with the enemy, and awaits battle *on a chosen position that it has strengthened*, then, *if the other side determines to attack it frontally*, its tactical procedure will be greatly modified, because the employment of the method of attack, already described, would undoubtedly only result, under the formidable fire of the defence, in a bloody repulse; as we found to our

cost at the Modder River, Magersfontein, Colenso, and Spion Kop. In *Lehbert's Handbuch für den Truppenführer*, edited by Major Hagen—a work very highly thought of in Germany—when describing the attack on a position that has been previously fortified, the necessity is asserted for employing, in field warfare, methods analogous to those made use of in siege warfare. It will be necessary, in such cases, to advance spade in hand, and to crush the enemy under a mass of heavy projectiles, fired from the large-calibre guns that nowadays follow armies in the field, and thus to finally arrive, under cover, at the decisive distances where the superiority of the fire of the attack will either cause the retreat of the defenders or permit of the assault being delivered with every chance of success.

The German regulations foresee the case where it will be impossible for the attack to approach the hostile position by day—

“The difficulty of crossing spaces beaten by the fire of the enemy will sometimes lead to the utilization of darkness in order to approach him.* Ordinarily, in such a case, the first line troops should approach, during daylight, to the limit of the range of the enemy's fire, then advance a little before sunrise in order to open fire at daybreak. The assault can even be executed during the night.”

The means for doing this need not be discussed here, but it must be admitted that if we had made use of some of the foregoing suggestions in South Africa,

* See *Combined Training*, 1902, section 20 (1).

we would have done well. General Skobeleff, after suffering two failures, with enormous losses, in assaults by day on the forts of Plevna, finally gained his object by the slower but more methodical process of taking up successive forward positions at nightfall, and fortifying them sufficiently during the night to enable him to successfully hold them during the following day.

So far we have dealt with the *offensive*. Turning now to the *defensive*, the German regulations are equally insistent on the value of infantry fire. After pointing out the need for an offensive defensive, if we desire to annihilate the enemy, and that no form of fighting is so dependent on the ground as the defensive, they state that every defence rests on the complete and abundant utilization of the fire-arm, and that it is from this point of view that the defensive position is to be chosen and strengthened. Von der Goltz says—

“If it is decided to offer a serious and decisive resistance to the end of the fight, the main point in the choice of the disposition to be adopted is to obtain the most favourable action possible for the firing; for it will be this action, and not the difficulties of the ground, that will constitute the principal obstacle to the enemy.”

The truth of this was well exemplified in South Africa. Hence, in the organization of a defensive position, the special point to keep in view is the possibility of utilizing the power of the fire-arm. The German instructions on field-works for their infantry state—

"The essential condition to be sought for in every defensive position is an open field of fire, particularly at the short and medium distances. Certain works necessary for clearing the field of fire may be more useful than the construction of shelters."

In *Lehbert's Handbuch für den Truppenführer*, already referred to, the following conditions are laid down for guidance in the choice of a defensive position* :—

"(a) Clear ground in the interior, in the front, and on the flanks of the position.

"(b) Good fields of fire to the front and on the flanks, dominating the enemy as much as possible.

"(c) Extent corresponding to the strength of the troops employed in the defence.

"(d) Such a general configuration as will compel the enemy to attack the position.

"(e) Favourable conditions for an ulterior development of the front, if found to be necessary later on in the fight, and for a counter-attack directed on the enveloping movements of the enemy.

"(f) Facility for manœuvring in the interior of the position; sufficient depth for the posting and employment of reserves.

"(g) Shelter against the sight and fire of the enemy.

"(h) Easy means for retirement.

"(i) Natural obstacles in front of certain parts of the front and flanks.

"(j) Possibility of advancing offensively, deployed for fighting, from the position."

* See *Combined Training*, 1902, section 24.

In the foregoing pages we have dealt with the extreme offensive ideas that have been developed by a warlike nation, possessing exceptional opportunities for obtaining practical experience in peace time of the effects of artillery and rifle fire under as near an approach to war conditions as it is possible to get in the absence of a real enemy. But their experiences relate to European conditions of enemy and country, and we must also bear in mind the high proportion of guns to rifles that obtains in the German Army, viz. six guns per thousand rifles, or a battery per battalion,* which, soon after the outbreak of a war, will be eight or more guns for a thousand rifles, because the "friction of war" tells far more on the infantry than on artillery. This heavy proportion of guns, and the telling fire they expect to get from it, has had a strong influence on bringing about the bold use of their infantry that the Germans have adopted. In South Africa we had only from two and a half to three guns per battalion, and this under conditions of fighting that demanded a strong artillery force of powerful guns. The wonder is that, under the circumstances, our troops did as well as they did do.

* We have now adopted the same proportion. The Germans, however, are talking of increasing their mobile artillery to one and a half batteries per battalion, and of increasing the shell and ranging power of their guns.

CHAPTER II

THE INITIATIVE

THERE is perhaps no expression more frequently used nowadays than the term "taking the initiative," with attached homilies as to its advantages. But, unfortunately, the word "initiative" is as frequently used to express totally different ideas. The four most prominent ideas that it is made to do duty for are: (1) taking the offensive; (2) forestalling the enemy in any particular design; (3) compelling the enemy to follow our lead or wishes; and (4) taking immediate action in sudden emergencies in the absence of definite orders. And we often find the same writer using the word "initiative" in all these senses within a few lines of each other, in spite of the absolutely different ideas involved.

The true meaning of the word "initiative" in military matters is the individual "taking action in the absence of orders," and such taking action naturally involves the acceptance of individual responsibility by the person taking it. Thus individual initiative and individual responsibility are organically connected, and cannot be

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separated. "Whoever speaks of initiative, speaks of responsibility."

We may take the offensive, forestall the enemy, and compel him to follow our lead, and yet there may be no need for the subordinate leaders to act on their individual initiatives. On the other hand, the enemy may take the offensive, forestall us, and compel us to follow his lead, as happened during the opening phase of the Boer War, and yet many occasions may arise for subordinate leaders to act on their individual initiatives. In war after war we have allowed the enemy to forestall us. For party-political, and falsely called humanitarian, reasons we are always loathe to strike and eager to spare, at the cost of an extra loss of life among our own troops, and of giving the enemy full warning and ample time either to prepare for the coming blow or to avoid it, as it may seem best to him. Thus our enemies can nearly always select their own time for the commencement of hostilities; they can fight or run at their own discretion; and they can cease fighting when they think proper. In doing this the enemy is not "taking the initiative," but "taking the lead," and keeping it. This is what so often happened in South Africa, and also in the Tirah and other of our wars. If in the Tirah campaign we had refused to commence operations till our opponents' crops were ripe; if we had then overrun, devastated, and pillaged their country; and then, when they wished to "come in," if we had refused to allow them to do

so, and had continued hostilities till we had completely cowed and broken them, we would have lost far fewer of our own men, and have taught them a lesson which would have been lasting, and more merciful and less destructive of life in the long run. Germany, in 1870, forestalled and took the lead over France, compelling the latter country to abandon its original offensive plan of campaign in order to concentrate its forces to meet the attack. This change of plans entailed the counter-march of numerous columns; the exposure of inferior forces to superior ones, and therefore to defeat in detail; the abandonment of strong defensive positions; and all the other disadvantages that follow from a loss of the lead in war. An army acting on the defensive can also take the lead by making the enemy do as the defenders wish. Thus, in the American Civil War, Lee, acting on the defensive, drew Grant into the thick forests of the Wilderness, hoping to overwhelm him there; and as Grant did exactly what Lee wanted him to do, Lee had the lead. Similarly, Wellington in his retreat to the lines of Torres Vedras, a deliberately planned operation to effect a definite object, had the lead over the French, as they had to follow his wishes. Thus "taking the initiative" is a very different thing from taking the offensive, or from forestalling the enemy in any design, or from compelling the enemy to follow one's lead, and it is to be hoped that, for the sake of clearness, the term "initiative" will be rescued from these false

meanings that have been so carelessly attached to it by so many writers.

Now, a little consideration will show us that there is a true and a false initiative, and that the amount of initiative that can be taken by any individual varies with the importance of his position in the military hierarchy, and of the rôle that he has to play in the great drama of war.

Individual initiative is the personal determination or impulse to action in war, and for it to be a true initiative, the determination to act must be limited by the known wishes of the superior commander, and carried out in accordance with it. Many men are often animated by a false initiative to gain some local and individual advantages, forgetful of the fact that an army is an organism, and must act as such, and that the good of the whole force must always regulate the activity of its parts. The cohesion of the whole force, and unity of its aim and action, can only be secured by all the units of the force working together in unison. A true initiative is always limited by the fact that it must operate in such a way as not to compromise either the action of any other part of the force or of the whole force. At Spicheren, on August 6, 1870, the German advanced-guard commanders acted on a false initiative, and risked a defeat; while at Vionville, on August 16, 1870, the German advanced-guard commander acted on a true initiative, and brought the retreating French army to a standstill. The initiative does not mean mere independent activity, but the intelligent dependence

of any activity that may be undertaken without orders. Hence an intelligent initiative is what is wanted.

"The initiative must extend from above, it must pervade the entire military hierarchy down to the common soldier, in the form of, or spirit of, offensive and daring; but it must be bound or limited, by means of tactical procedure, in as firm a frame as possible, within which personal determination still affords a wide field of action, and will always continue to do so. *But the impulse to action in war can naturally only be given by him who knows the object he wishes to attain, and the means at his disposal for the purpose; and not by any one who can only see what is in his immediate vicinity, and not the whole.* Greater care should be taken in the employment of the word 'initiative' as a tactical expression. Generally the meaning it is intended to convey is only an ordinary tactical obligation; it is the self-intelligible endeavour to convert the practical considerations on the battle-field into deeds, according to the immediate situation and the objective, without losing sight of the general situation. A just estimate of the true tactical value of the initiative may be derived from these limitations. A correspondingly moderate appreciation can only lead to the prevention of exaggerations and illusions, which have undoubtedly made their appearance latterly in tactical questions, and which, if transferred to the battle-field, must lead to serious consequences, if we are opposed to an enemy who holds strongly against compromising the combined action of his forces by tactical habitudes [involving false initiative] which might find a place in detachment warfare, but not in a ranged battle."*

* Von Lobell's *Annual Report on the Changes and Progress in Military Matters during 1894.*

This quotation, though expressed in somewhat stiff language, admirably condenses the whole subject of the initiative. The individual taking the initiative should know the general purpose of the movement that he is, as an integral unit, taking part in, and his own rôle in that movement, so that he may be able to act intelligently, in accordance with his knowledge, in the absence of orders when cases of sudden emergency arise. In fact, the term "initiative" can only apply to subordinate leaders when carrying out the general idea of a superior under the pressure of unforeseen contingencies arising, and when time does not admit of definite orders being sought for and received.

Cavalry requires greater freedom than any other arm for taking the initiative, and artillery the least. Guns must nearly always be used collectively in battle, because guns used singly can never effect any really useful tactical result. In minor operations this primary rule may be broken at times. In the case of cavalry, the opportunities favourable for its action are generally so fleeting that cavalry leaders must, in the majority of cases, normally act on their own individual initiative, and be allowed to do so. Horse artillery acting with cavalry requires more initiative than the divisional and corps artillery, but portions of the latter bodies may, under certain critical circumstances, also take the initiative. Advanced-guard commanders are not likely, in the future, to be often called upon to take the initiative, since the commander of the force will

probably be with the advanced guard; but rear-guard commanders, on the other hand, will require considerable freedom of initiative. The initiative of divisional, brigade, battalion, and company commanders is limited by the definite duty assigned to them respectively in the larger drama of the battle.

But the initiative must even descend to the rank and file in these days of dispersed formations, when it will be often impossible to give definite directive orders to them. Again, in modern fights the percentage of casualties among officers is likely to be higher than ever, and even in past wars, non-commissioned officers have had to take charge of companies and even battalions. Consequently both non-commissioned officers and men must be prepared to act correctly without orders in the absence of their officers, and for them to be able to do this, they must be previously informed of the object of the fight, and the part they are expected to play in it.*

In the new conditions of warfare, the higher leaders will not be able to exercise that close supervision over the action of their subordinates that was possible before the introduction of the modern fire-arms, which have rendered necessary the great dispersion in front and depth of the present fighting formations. Nowadays

* On more than one occasion during the South African War, the disadvantage was felt of having young and inexperienced officers placed over older and experienced non-commissioned officers; the latter, often in action, took the entire control of the men out of the hands of the former, even to ignoring their orders.

a battalion commander's control over his leading companies is lost very shortly after the first deployment and extension has taken place, and, consequently, his influence on the course of the fighting of the battalion will, in most cases, be confined to supporting his advanced companies, keeping them supplied with ammunition when possible, looking after the safety of his flanks, and perhaps throwing his reserves into the firing-line when a crisis arises.* Hence his main object should be to ensure that his initial arrangements are suitable to the task assigned to him, and to fully explain to his subordinates and men the task that lies before them, the purpose they are to work for, and the general lines on which they are to act; because once committed to the fight, they must be relied on to think and act for themselves according to the circumstances that may arise, since the most active and energetic battalion commander will then be unable to prompt or assist them, and the fortune of the day will depend as much on the initiative and resourcefulness of the company and section leaders and of the men as on the foresight and experience of the higher commanders. Hence special attention should be paid to training the intelligence of the officers, non-commissioned officers, and men, so as to make them observant, self-reliant, alert, and helpful. Nowadays, when opposed to modern fire, we must normally look as much to the intelligent

* See *Infantry Training*, 1902, sections 171 (4), 212 (2), 212 (4), and 217 (2).

co-operation of many small units, and even of the men, as to the combined action of the larger units that embrace them. And, therefore, the more our system of training tends to develop the intelligent initiative of our subordinate leaders and men, and to accustom them to act, without hesitation, in accordance with the purpose of the fight, on their own responsibility in the absence of orders, the greater will be their aptitude to carry out the fight with vigour and resolution in the stress of battle, and the greater will be our chances of victory.

We are, however, far from the ideal of having our ranks imbued with the spirit of individual initiative. General Buller, in a memorandum issued on the 6th of February, 1901, at Aldershot, on his return from South Africa,* states—

“Speaking generally, it might be said that our Army lacks initiative and independence of action on the part of subordinate commanders, and independent and intelligent action on the part of the rank and file. Drill was instituted to teach men the principles on which they should move, and to inoculate the habits which must govern those movements. In field practices drill ceased, and commanding officers must accustom themselves to allow more independence of action to those under their command, and educate all ranks to act more on their own initiative. No training could be so bad for a man of action as to teach him to do nothing until he was sure that he knew exactly what to do. He must be taught first the duty of acting, and then how to act in particular cases.”

* Copied from a newspaper report.

And Earl Roberts, speaking at Bisley on the 20th of July, 1901, said—

“The two points that the war in South Africa brought forcibly to my mind are, first, the necessity for making our soldiers good shots, and, secondly, for developing their individual intelligence. . . . The necessary alterations which seem to me to be necessary in rifle-shooting have already been introduced into our musketry regulations, and in the new issue of the *Infantry Drill Book* more scope will be given to section commanders in order to develop the individual intelligence of the men.”

All true individual initiative must rest on the intelligence and determination of the individual. Further, in September, 1901, General Sir Redvers Buller, in a memorandum on the field-firing that had then taken place at Aldershot, stated—

“In the words of one of the umpires, there was a great lack of initiative. Company commanders did not act independently, but were always waiting for a senior officer to give orders, or if, in rare cases, the initiative was taken, the senior then prevented its recurrence. This criticism appears, from what the General commanding himself saw, to be a fair one. In one case interference was so marked that steps had to be taken by the umpire to limit the powers of a senior officer. What we have to try and teach is the value of independence and initiative when combined and controlled by discipline. Section commanders mixed themselves up too much with their sections, and failed either to give them points on which to advance or to direct their fire. Distances at longer ranges were indifferently judged, but at the same time a great improvement

was made in the general conduct of the operations. In most cases, particular attention was paid to try and keep down the fire of the guns, and the shooting at short ranges was very good."

Now, since the ability to set in motion an intelligent initiative, suitable to the rôle and circumstances of the individual and in keeping with the general idea of the fight, is of such immense importance for all ranks, it is worth considering why our Army is so deficient in this respect. The chief cause of it is undoubtedly due to the fact that many commanding officers are afraid that they will be held responsible for the mistakes made by their juniors, and that, in consequence of this, they will not be either recommended or "selected" for promotion. This leads to such an interference with the executive duties of the juniors as would be impossible in active service; and this, again, teaches these juniors to always expect assistance and advice, even when it cannot be given them, and then, when it is not forthcoming, they do not know what to do. So great was this tendency to interference in 1899, just before the outbreak of the Boer War, that General Hildyard, at the conclusion of the training of his brigade at Aldershot, was obliged to point out the great necessity that existed for self-restraint on the part of superior officers in meddling with what they considered to be errors on the part of juniors in charge of units, *even whilst the orders received by the latter were in course of actual execution.*

Now, it must be borne in mind that, if men are not accustomed in time of peace to exercise initiative and to accept responsibility, they are not likely to suddenly develop these necessary qualities in the face of danger. Hence it is well to consider what steps should be taken to promote a better state of things. The first step in this matter is the frank recognition that more is to be learnt from mistakes than from correct action, and that mistakes must always occur, because no man is free from errors of judgment, however good his purpose or motive may be. The second step is to make the captains of companies responsible for the training of their subalterns. The subalterns should be reported on, in the first place, by their captains, who are at present entirely ignored in the matter, and not by the colonel of the battalion, whose opinion should only be given when an adverse report on a subaltern is sent in. Such a procedure would make captains of companies feel more deeply their responsibility and duties. The third step is the removal from the service of those officers, or the reduction to the ranks of those non-commissioned officers, who, after a reasonable trial, show themselves incapable of learning, and to be unfit for their position. In the Navy, selection for promotion affects the lower ranks only; in the Army, the converse is the case: but the Naval custom is the only really sound one. Selection for rejection is a far sounder principle to act on than selection for promotion, and is less liable to abuse. The importance

of company commanders is increasing more and more as improvements in fire-arms increase the need for dispersed formations and the intelligent co-operative individual action of the scattered units and men; and therefore those subalterns who fail to show any adequate military qualities should never be promoted to the rank of captain, and those captains who fail in power of leadership should be removed to other non-tactical spheres of duty.* After that, promotion can safely go on by seniority, and without senior officers having any fear as to their future being dependent on the actions of their juniors. At the same time, the juniors will have every inducement to learn their professional duties as perfectly as possible. In this matter we have much to learn from the Navy, where individual initiative and responsibility are undoubtedly very highly developed.†

A readiness to take the initiative when occasion demands can only come from the exercise of authority and the corresponding taking of responsibility; and it can be cultivated in every one who has any natural

* Before dismissing subalterns and captains from their regiments, it might be well to first give them further trial in another regiment.

† As an instance of the judicious way in which naval officers are treated, the following case can be quoted: A turret ship and a torpedo-boat were damaged while manœuvring, the former by touching a rock. The admiral of the station, after investigation, decided that the officers concerned had done the best they could under the circumstances, and all that happened was that the vessels were sent into dock for repair. When the admiral was subsequently asked if anything would be done to the officers concerned, he replied, "No! as they must not be made to fear responsibility and determined action."

gift in that direction. If they have not got that gift, they are useless in places of authority and responsibility, and there should be no sentimental hesitation in removing them from such positions after fair trial, since in their hands lies the lives of their men and the success and honour of their country.

A more difficult question is how to train the rank and file to properly act on their own initiative.* Courage, endurance, and discipline are military virtues that have been conspicuously displayed by our incomparable British soldiers in the long and weary struggle in South Africa; but they were found wanting, at all events in the early part of the war, in capacity to think and act for themselves both in the emergencies of campaigning and in the stress of battle. This defect is due to many causes, the chief of which is the whole trend of their military training and existence. In the first place, our men are brought up from childhood under the influence of a complex civilized system of living that offers little or no scope for the cultivation of those individualistic qualities that tell in the rude and primitive conditions of war. It is the savage, in his constant struggle against Nature and cunning foes, who is best situated to think and act for himself, and to adapt himself to circumstances. And in this respect many of our colonists have an advantage over our town and

* Lieut.-Colonel E. S. May, R.A., offers some admirable advice on this subject in his book, *A Retrospect of the South African War*, chap. ii., on "Military Instinct."

country-bred recruits. But, under proper training, the deficiencies arising from non-use of the qualities of cunning and adaptiveness, which are inherent in the human animal to a greater or less degree, can be rectified to a great extent, especially by an education designed to develop and strengthen those qualities which have been to some extent atrophied by disuse, aided by a general mode of existence that will make the men think and act more for themselves in the more ordinary matters of life. It is no use making a soldier an exotic to his ordinary environment—to think and act for himself in purely tactical matters alone, and not in the other matters concerning his everyday life as well. And this is just where the main difficulty lies, and where so much will depend on the company commander's administration of his unit. It is fairly easy to teach a man to think and act for himself in matters relating to scouting, skirmishing, musketry, outposts, etc.; but it is very difficult to carry the same principle into his everyday barrack-room life.

In our present system we take the greatest pains to entirely obviate the necessity of a man thinking for himself, while we surround him with such a host of petty restrictions as only tend to make him an automaton. Directly a man becomes a soldier the struggle for existence ceases; he has no need to think for himself, for that is the business of his officers; he is housed, clothed, fed, and every petty detail affecting his comfort and convenience is arranged for him. He is dry-nursed

by his officers at every turn, under the influence of multitudinous regulations, mostly grandmotherly in character, which completely restrict his freedom as an individual in many matters that do not affect his military efficiency in any way. The difficulty is to propose a remedy, and especially a remedy that will bring about a healthy gradual change and not a destructive revolution, entirely upsetting all old ideas and customs.

In the first place, a man's pay should largely depend on his proficiency in musketry and in scouting.* A man who can shoot well and scout well, entailing the use of common sense as well as of his other five senses, will be the man who will count the most in battle. By making a substantial portion of their pay depend on such things, the men will be encouraged to develop the primitive animal characteristics that are so much in demand nowadays in war.

In the second place, the men should be gradually given a large share of responsibility in the management of their affairs, especially as regards their travelling and feeding, and the canteen and regimental institute. The admirable system in vogue in the Royal Marines, in which every recruit is taught at their depôts to cook, and sew, and to make and repair his own clothes, pitch tents, load baggage, etc., might well be imitated in the Army, for there is no greater handy-man and no better soldier than a Royal Marine private.

* See paras. 20 and 21, *Musketry Regulations*, 1903.

In the third place, the company commanders should have greater powers for allowing anything that they consider will serve to strengthen the character and self-dependence of the men under their command. Too many of such questions are referred to the battalion commanders, who should normally directly command the captains of the companies, and indirectly command the men through their captains only. Of course, the company commanders must be held responsible for the military efficiency and discipline of their men, but there is no reason why every company and battalion should be bound by the same petty restrictions in all things; in fact, a rivalry among units, in respect to giving rational freedom, would be a very healthy thing. Another good result of this would be the reflex action that it would have on the company commanders in strengthening their moral powers for command and leadership, which is a most important factor in these days of the rising importance of company commands as the true fighting units.

The importance of the initiative for the efficient use of the rifle in war is so great as to afford an ample apology for the foregoing remarks on the subject. The character of the system of examinations for the promotion of officers has also a powerful influence on the general subject of the initiative, but as it has no direct bearing on musketry it is not dealt with here. The suggestions that have been made may be considered by many to be utopian and unpractical. Let this be

granted; but some change is required to meet the higher personal demands that have been created by our national system of education, and by the general rise in the national standard of living. These important influences, as well as the widespread growth of the democratic principle among all classes in our Empire, have not been either adequately recognized or provided for in our present Army system; but the more a national Army reflects the national character and ideals, the stronger it will be morally, because any serious divergence between the nation and the Army in such matters only leads to military discontent, and, therefore, to inefficiency in a greater or less degree.

CHAPTER III

THE INFANTRY WEAPON

The Rifle.

THE experience gained in South Africa has clearly shown that the dominant tactical factor on the battlefield is the infantry arm with its modern weapon. The present-day infantry weapon is a small-bore magazine rifle, using a smokeless "powder" or propellant, and throwing a light small-diameter elongated bullet to a very considerable distance with a very flat trajectory. The object of all rifle-fire is to so intimidate the enemy as to make him powerless to resist an advance to capture him. This is the primary object of rifle-fire, and, to effect it, it is usually necessary to hit a certain number of the enemy's officers and men; and in this respect we may say that the first purpose of a rifle is to hit a distant enemy; the second is to hit, and the third is to hit. However, in many cases, the necessary intimidation is produced by the fear that the enemy has of being hit, but then the bullets must be falling near and about the enemy to create this fear.

With most modern rifles, at ranges under 600 yards, the bullet in its curved flight does not rise over the average height of an upright man above the line of sight. Consequently, if the backsight is set at 500 yards (called with our present rifles the "fixed sight"),* and aim is constantly taken at the feet of an advancing upright man situated within that range, he should theoretically be hit somewhere on the body without the firer having to alter the backsight elevation. This theoretical possibility is easily attained in peace time, provided the sighting is true in direction, which is not always the case; but, in the midst of the dangers and demoralizing impressions of a fire-fight, the theoretical possibility is only attained with difficulty, owing to the excitement of the men, and the difficulty of holding the rifle steadily after prolonged firing, especially when combined with rapid movements that produce heaving chests seeking to regain breath. However, the advantage of not having to attend to the elevation of the backsight when ranges are rapidly altering at the shorter and "more nervous" ranges is a very great and real one. But as men are always much excited and hurried at such ranges, and probably much exhausted as well, their fire is always high; consequently *the "fixed sight" in battle should be much less than the theoretical one*, especially when firing up or down hill. (See Appendix III.)

* See p. 195. See also para. 268, *Musketry Regulations*, 1903, and section 107 (5) *Infantry Training*, 1902.

The Bayonet.

Though the rifle, with which the infantry is armed, is a projectile-throwing weapon, yet it is provided with a pike, called the bayonet, that can be attached to its muzzle in order to enable the rifle to be used as a stabbing pike, whenever it is feasible to apply hand-weapons and brute force on the enemy. We must always remember the enormous value of the moral factors involved in all military operations. The moral effect of a successful bayonet charge is indescribable. It simply shatters and destroys the enemy's power of resistance, provided the charge has been properly prepared for by the reduction of the enemy to a condition of "nervous pulp" by means of a previous efficacious fire from both rifles and guns, or by means of a demoralizing surprise. *The ideal of battle for every soldier must be the application of brute force combined with the use of his hand-weapons, and consequently he must be fully trained to the idea of the absolute necessity of his closing on the enemy when called on to do so.** The laurels of victory should ever be looked on as resting on the point of the hand-weapon—the fire-power of the rifle and gun being looked upon as merely the best preparatory means of rendering the essential bayonet or cavalry charge feasible and possible. The enemy may not wait to receive the charge, but, whether

* See *Infantry Training*, 1902, sections 158, 221, and 249; and *Combined Training*, 1902, sections 3 (1) and 22 (2).

he waits for it or not, the desire to close with him must be put into effect as soon as the opportunity comes for doing so successfully and without incurring undue and crippling losses. Consequently the bayonet must ever remain as an integral part of the infantry weapon.

Certain writers, forming hasty conclusions from the exceptionally abnormal operations in South Africa, have led the way in decrying this use of the bayonet by infantry, basing their arguments on the idea that all battles in the future will be settled by artillery and rifle fire alone. As one well-known historian of the Boer War puts it—

“One absolutely certain lesson of this war is that there is—outside the artillery—only one weapon in the world, and that weapon is the magazine rifle.”

But the Boers showed a strong disinclination to close with our troops, and military amateurs are apt to forget that the British infantry have to fight in almost every quarter of the world, and constantly against savage enemies, whose great aim is to come to close quarters. They must, therefore, of necessity, have a weapon that will admit of hand-to-hand fighting, and our men cannot afford to discard the bayonet, however good shots they may be. In the Soudan, in Zululand, in Eastern and Western Africa, in Afghanistan, on the frontiers of India and in China, there have been many occasions, in the present as well as in the past, when the bayonet has been indispensable, for without it our

troops, both European and native, would have often fared badly. Again, in the storming of entrenched positions, and stockades, the infantry must have something more than the rifle. Some men may argue that straight rifle-shooting, assisted by artillery fire, will do all that is necessary, but in doing so they have ignored the behaviour of human nature in the mass in moments of great moral and mental strain; in the din and excitement of a charge at close quarters the best marksman will shoot wildly. The late fighting in China, where our troops, both British and native, had to face an enemy sometimes outnumbering them ten to one, has shown that the moral effect of a bayonet charge is as great as ever it was, at least where Asiatics are concerned. At the long and medium ranges the Chinese fired with a fair amount of coolness, though their aiming was not good; but immediately they saw our men getting to close quarters, and a line of bayonets flashing out, they grew flurried and their shooting became hopelessly bad. And when it came to the final rush, the Chinese, both regulars and Boxers, broke and fled, except in a few isolated cases where a small number of them rallied around their flags and were bayoneted where they stood. In the Soudan our troops had frequently to rely largely on the bayonet. On the North-West Frontier of India, to ask even the best troops, with only rifles in their hands, to face a night or even day charge of frenzied religious fanatics armed with swords, would be to try them very highly,

even if their magazines were full when the final rush takes place. It is a very different thing facing a civilized foe, who will give quarter, from facing a savage foe whose future happiness in the heaven that he looks forward to depends on his shedding or even attempting to shed infidel blood. And we must also remember the great moral effect that such a wild foe must have on troops recruited from the calm and quiet social conditions of civilized city life. When a camp is suddenly attacked at night and the enemy force an entrance, how are they to be cleared out, without danger to friends, if the bayonet has been discarded? Firing under such conditions is most dangerous. When General Turner's camp at Wana was attacked by Waziris, two companies of the 3rd Sikhs and 20th Punjab Infantry fixed bayonets and drove the enemy out. And in the assault on the Malakand, the mass of hostile swordsmen would certainly have been stimulated to charge, had it not been for fear of the bayonets in the hands of our troops. Many other such instances could be given. And again, in South Africa, the very fact of our men having bayonets deterred the Boers, in the great majority of cases, from forcing the fighting to close quarters; and this was so much the case that some of the Boer leaders expressed the wish that their men had been equipped with something more than rifles. In the Boer assaults upon Caesar's Camp and Wagon Hill, outside of Ladysmith, their first success could not be fully taken advantage of by them, as no determined rush could be

made, because, being without bayonets themselves, they would have been at a serious disadvantage when once the assailants and the assailed had become mingled together in the confusion of close fighting; the Boers, therefore, had to rely upon their rifles alone, and they paused to fire when they should have been charging over the slopes over which the reinforcements were hurrying up to reinforce the endangered positions.* Thus the bayonet must ever remain an integral part of the infantry weapon. Even if we have the best-shooting infantry in the world, and even if we have the best rifle that can be invented, yet, so long as there is any possibility of close fighting, and so long as human nature remains as impressionable as it always has been and now is, the infantry must be given a pike with which to defend themselves at the last extremity.

Another point we must always bear in mind is the moral effect produced by the possession of bayonets, even where there is no hand-to-hand fighting; and also that, with magazine rifles, there is always the very likely danger of the ammunition running short, and even of the magazines being empty when the enemy closes.

Marksmanship.

The subject of skill in the use of the rifle under field conditions is one of such present importance, that

* At the fight at Vlakfontein, May 29, 1901, the two guns rushed by the Boers were recaptured by a bayonet charge of our infantry.

it requires the special attention of all officers. In a memorandum issued by Earl Roberts on the 29th of July, 1899 (*i.e.* before the outbreak of the Boer War), addressed to the officers, non-commissioned officers, and men under his command in Ireland, he dwelt upon the paramount importance of soldiers being able to shoot well,* and of their being proficient in that combination of marksmanship and fire-control comprised in the term "musketry." He said—

"High courage, sound health, power of endurance, discipline, organization, and leading are the qualities which have enabled British troops to win battles from Crécy to the present day; and, though these qualities are as essential now as ever to an army which hopes to achieve great successes, yet, under the existing conditions of war, they all become more or less subservient to musketry at the supreme moment of actual conflict with the enemy. However steadily and rapidly troops may have been trained to move, and however boldly and intelligently they may have been taught to take up positions, unless they are able to use their rifles with effect when they have gained the vantage-ground they will be of little avail for the culminating point of all military training and instruction, *viz.* the struggle for victory between two forces, each armed with far-reaching, death-dealing weapons. . . . Efficiency in musketry, like everything else in the Army,

* On the 20th of July, 1901, Earl Roberts, when distributing prizes at the National Rifle Association meeting at Bisley, emphasized the paramount importance of soldiers being expert in the use of their rifles, and stated that, after his South African experiences, he was more confident than ever that rifle-shooting is the most important part of a soldier's training.

depends upon the officers, and, to enable musketry to be given its proper place in the curriculum of military education, it is essential that officers should prove in a practical manner their belief in its importance by frequently taking part in range practices, and by competing at meetings such as this. I can affirm from long experience that the corps most proficient in musketry have been those in which the officers set the example by practising shooting themselves, and were able to get their men to take an interest in the subject by making them understand how much depends upon their being skilful in the use of their rifles, and that the object of all parade movements and formations is to bring a rapid and effective fire upon the enemy. When musketry was first begun in earnest, attention was very properly exclusively directed at fixed objects at known ranges; and although this system of instruction must always continue to be the basis of our musketry training, we are nowadays sufficiently advanced to warrant our attempting what is much more difficult, viz. firing at moving objects at unknown distances, and also at fixed objects differing in form and colour from the well-known bull's-eye of the rifle-range. This is the kind of shooting that is required in skirmishing and jungle warfare, and considering the tremendous power of the modern rifle in the hands of first-class shots, we should spare no time, trouble, or expense in educating a proportion, at least, of our soldiers to be real experts in the use of their arms—men who would be able to act as usefully and intelligently as the Ghoorka scouts who were employed with such admirable results by Gen. Sir William Lockhart during the Tirah expedition."

The ideal sketched out here depends on several concurrent factors, chief among which is that the men

retain coolness and judgment under fire, and have good eyesight. The shooting power of a rifle in the field depends mainly on "the man behind the gun." However perfect the rifle, it will have but little tactical use if the man using it cannot see, or loses his nerves and gets excited.* To direct his rifle properly and not to get flurried, are some of the chief things a soldier has to learn. And to enable the soldier to direct his weapon properly arises the necessity for the *accurate sighting of the rifles*. It was only after the Boer War had actually begun that it was officially realized that the sighting of the whole of our Lee-Enfield rifles hitherto in store (but not that of the Lee-Metfords in use) was so inaccurate that it was not possible to hit a target the width of a man's body at any distance between 200 and 800 yards, if aim was taken straight at its centre. To hit such a target it was necessary to aim about 5 inches for every 100 yards of the range to the left of the centre. That such an error should not have been discovered earlier can only be attributed to the confidence that every one placed in the accuracy of the Government rifle, and to considering all errors of shooting as due to the man. It is said that the error was brought to the notice of the War Office by members

* An officer, who has seen much active service in East and West and South Africa, told the author that he could not bring to mind any case in which he had seen men deliberately aim when under a hot fire; the majority fired anyhow, and he considered a man to be "good" who made any effort to direct his rifle towards the enemy.

of the Imperial Yeomanry who had volunteered for South Africa. The result was that the Government factories were engaged day and night, including Sundays, in turning out new-pattern slides for the backsights of the defective rifles in actual use. However, it is satisfactory to know that in future every rifle is to be tested as regards the accuracy of its sighting before being issued for use. The method hitherto in vogue has been to obtain by experiment the graduations on a trial sight, and then to treat this one as a sealed pattern one to which all the others were made, independently of the special idiosyncrasies that every rifle has, however carefully it may have been made.*

The foregoing defects affect the direction of the line of fire, and cause it to deviate from the direction of the line of sight.† But there is the further fact to be borne in mind that the most perfectly sighted rifle cannot retain its accuracy of fire unless its sights are most carefully preserved from harm. No doubt it is impossible for the soldier's rifle to receive the same amount of care as is bestowed on rifles used solely for match-shooting, because it is necessarily subjected to much wear and tear from the daily handling it receives at drill, manœuvres, range and field firing, etc. In this wear and tear the foresight suffers most, while the

* Compare para. 261 of *The Musketry Regulations* of 1903.

† The *line of fire* is the prolongation of the axis of the barrel at the moment when the bullet leaves the bore; the *line of sight* is the line passing through the eye, the two sights, and presumably the target aimed at, at the moment the rifle is fired.

backsight, being in a more protected position, suffers much less. But the foresight is perhaps the most important part of the rifle, and yet, from its unprotected state, it is liable to injury in many ways—either by being worn down, which affects the ranging of the bullet, or by being bent, which affects both the ranging of the bullet and the direction of its flight. Most military rifles that have been in daily use for any length of time, are affected in one or both of these ways. This points to the need of a permanent sight protection, as a fixed part of the rifle—one that will protect the foresight from injury while not interfering with either the aiming or with the fixing of the bayonet. A little tunnel of thin sheet-steel, encircling the foresight, would effect this while giving increased facilities for aiming accurately, as many who have used a similar device well know. The brightness of the day, and the position of the sun, affects the amount of foresight used at different times and days, if the foresight is uncovered, and therefore the ranging of the bullet.* The proposed tunnel would eliminate this varying use of the foresight, and therefore the varying elevation and direction of fire that it causes.

The construction and graduation of the backsight of a rifle depends on the height of the foresight. The use of a *full foresight* is rightly allowed for, since in the trying conditions of field operations and of battle men cannot make use of a fine foresight. A difference in

* See para. 271, *Musketry Regulations*, 1903.

elevation is caused by using the foresight full and fine, and the effect on a vertical target is to cause an alteration in the height of the bullet of more than half a foot for every hundred yards in the range.

However, there is another factor that seriously affects the ranging of the bullets, and therefore the shooting of our rifles, and that is the wearing out of the barrels caused by the use of the modern metal-coated bullet.* It is quite a common thing to find two men firing, side by side, at the same range, and equally well, using backsight elevations differing by 100 yards or more, though both are using the same amount of foresight. Again, our rifles are supposed to be sighted for a full foresight, which is the only kind of foresight that can be used by men under the conditions of war, and yet, on the range, with the backsight theoretically correctly set, a fine foresight has often to be used to get good target results. The wearing out of the barrel also causes, in time, an irregular flight of the bullets fired, by making them move spirally round the theoretical mean trajectory; this is especially felt at the longer ranges, and seriously affects the accuracy of the fire. These facts are of very great importance to bear in mind, as we shall see presently, as it affects the efficacy of the rifle-fire of both sides as a war progresses. As the barrel gets heated, especially in rapid firing,

* The wastage of rifles during the late South African War was enormous, but this wastage included rifles captured by the Boers, as well as wear and tear and damage. This wastage applied to the Boers as well as to us.

the bore expands and the ranging of the bullets decreases.*

It is not generally known that, when a rifle is fired, the barrel immediately begins to vibrate violently in both vertical and horizontal directions.† As the rifle and its ammunition have definite weights within such small limits as will practically allow the rifle to be fired under the same conditions, it is easily seen that, from the moment the bullet starts moving, the barrel, subjected to various stresses, begins to vibrate in a more or less definite and regular way, and that these vibrations affect the shooting. Thus, for the *same* rifle and the *same* ammunition, the vibrations are practically the *same* for every round fired, and the bullet always leaves at practically the same point in the regular periodic movements of the muzzle caused by the combined vibrations. The actual vertical and horizontal deviation of the muzzle of the barrel, at the moment when the bullet leaves it, are known as the vertical and horizontal "jumps." But change the rifle in any way (*e.g.* by altering the length or thickness of the metal of the barrel, by removing the upper part of the stock, or by fixing bayonets), or alter the ammunition in any way (*e.g.* in the weight, or shape of bullet, or in the amount or character of the propellant), and the resulting vibrations set up in the barrel are at once changed, as also the point in the combined vibrations at which the

* See para. 269, *Musketry Regulations*, 1903.

† See para. 265, *Musketry Regulations*, 1903.

bullet leaves the barrel. These facts have been proved by the results of instantaneous photographs taken from one side of, and from behind, the rifle when fired. The sighting of a particular rifle entirely depends on the practically constant vibrations set up in its barrel by the "constant" ammunition to be used with it. It is in consequence of the constancy of these vibrations, and of the point in them at which the bullet leaves the barrel, that some rifles throw low (like the Martini-Henry) and others throw high (like the Lee-Metford and Lee-Enfield); while at the same time throwing to the right or left, if they throw laterally at all.* The Martini-Henry rifle and the Lee-Metford rifle, with its early powder-pellet propellant, had no lateral or horizontal "jump," but when the propellant was changed to cordite, the Lee-Metford rifle threw to the left as well as high. Consequently the foresight was placed to the left of the centre of the barrel,† and the sighting provided had to be such as to give the axis of the barrel no elevation at 200 yards. But subsequent changes in the rifle and in its ammunition have produced different vertical and horizontal vibrations or "jumps," while the sighting has not been correspondingly changed. This explains why the sighting of so many of our older rifles proved so inaccurate.

* This lateral "jump" is quite a different thing to the "drift," or the rolling of the bullet sideways in the air, due to its rotation. The vertical "jump" is also dependent on the way in which the rifle is supported on any cover or rest, as this support affects the vibrations set up.

† See paras. 233 and 234, *Musketry Regulations*, 1903.

Another important consideration in connection with the rifle is the "pull-off" of the trigger. The regulation "pull off" is abnormally heavy, and it gradually increases as time goes on. Now this is a most important point, since the easy pressing of the trigger is one of the chief factors in good shooting, supposing the sighting to be accurate. Most men can learn, with fair ease, to direct their sights correctly on to the point aimed at, but they fail to keep them on it when pressing the trigger, and then the harder the "pull off" the worse they shoot. Good shooting is more closely allied with the good use of the trigger than is generally recognized, and it is for this reason that so many men have become good shots by constant practice with miniature rifles, by which they get the eye, brain, and hand to work correctly together.* But with a hard "pull off" accurate shooting becomes very difficult. What is known as the "draw pull" is a great advance in the matter, and it is to be hoped it will be brought into use in the near future in our military rifle.

The foregoing facts show that military rifles vary very much in their shooting value. Indeed, the older rifles will hardly ever shoot the same as the newer ones with the same backsight elevation. Consequently in

* The eye informs the brain when the sights are aligned, and the brain has then to inform the finger to press the trigger. These operations require a small but appreciable time. It varies with different people, and can be diminished by constant practice. Until a rapid inter-relation between the eye, brain, and hand is well established, no one can be a good shot. It is most easily acquired by early practice in youth (see footnote, p. 222).

war, when verniers are useless and the effects of the shooting are not known for certain, we must allow a very wide margin for the shooting performances of numbers of men armed with rifles of different ages.

What has been said about the sighting of a rifle being influenced by changes being made in the rifle, is well illustrated by the effect of fixing bayonets.* By fixing the present bayonet on the present rifle, the vertical and horizontal vibrations or jumps are so altered that the rifle throws the bullet lower and to the right. If the 500 yards' elevation is used with a fixed bayonet, the bullet only ranges 400 yards, and does not rise more than $2\frac{1}{2}$ feet above the line of sight.

As regards the recoil of the rifle, and the "throw up" caused by it, it has no appreciative effect on the sighting of the rifle, because the bullet leaves the barrel before the rifle has recoiled axially, even one-eighth of an inch—that is, long before the upward movement of the muzzle of the rifle, that we call the "throw up" begins.†

After a bullet leaves the barrel of a rifle, its swift rotation around its axis,‡ given to it by the rifling of

* See paras. 266 and 268, *Musketry Regulations*, 1903; and sections 107 (5) and 158 (4), *Infantry Training*, 1902.

† This "throw up" varies with the attitude of the firer, and with the way in which he holds or supports his rifle. But, as the bullet has left the barrel before it begins, these variations in the "throw up" do not affect the shooting.

‡ The velocity of this rotation practically remains the same during the whole flight of the bullet, and greatly assists its power of penetration on striking.

the barrel in order to make it travel point foremost, causes it to roll or "drift" in the air in the direction of its rotation.* In consequence of this, the bullets, with the left-handed rifling of our present rifles, drift more and more to the left of the line of fire as the range increases and the velocity of forward motion decreases. The drift at 1000 yards is found to be about 11 inches, and at 1200 yards about 23 inches;† while at longer ranges it reaches to many feet, and requires aim being taken to as many feet to the right of the target. A wind from the right will act with the drift in making the bullet go further to the left; while a wind from the left will act against the drift, reducing its effect. This is an important point to bear in mind when carrying out any very long-range firing.

Machine Guns.

Another infantry weapon that requires some mention is the rifle-calibre machine gun ‡ using rifle ammunition. All that is said in the following pages about the use of the rifle in the field, bears to a great extent on the use of the machine gun under similar conditions. The machine gun is only an instrument for securing a rapidly delivered concentrated rifle-fire on a given

* See para. 267, *Musketry Regulations*, 1903.

† The drift is probably somewhat to the right during the earlier part of the time during which the bullet is rising in its trajectory. This accounts for the small drift up to 1200 yards.

‡ See *Infantry Training*, 1902, sections 235 and 251.

objective, and its use is confined to the same ranges as are suited to the rifle. Its carriage should be so designed as to enable the gun, if necessary, being used close to the ground so as to render it as invisible as possible. The continuous noise of the rapid and sustained discharge of a machine gun is apt to betray its locality, and to draw on to it the attention of the hostile artillery.* Consequently, machine guns should be mainly used in concealed positions and from behind suitable protective cover. The rapid succession of bullets that issue from a machine gun often enables the "strike of the bullets" to be seen when ordinary rifle-fire fails to make it visible, and in such cases the machine gun acts as an excellent range-finder.

The machine gun now in use can fire about 600 rounds a minute, or 10 a second. This is a far greater rapidity of fire than is really necessary, for it means that a man or horse is struck several times before falling. It is a good thing to be able to fire 600 rounds a minute on occasions (such as for range-finding), but a far slower rate of fire (say 100 rounds or even less a minute) is ample for all ordinary tactical purposes against living beings and animals, whilst causing an enormous saving of ammunition.

* The shield carried on a machine gun is only effective against a frontal fire directed against it. It will not protect the men firing it from a flanking fire, or from a concentrated fire coming from a considerable frontage.

CHAPTER IV

LONG-RANGE FIRING AND RANGE-FINDING

A VITAL principle in battle is the mutual organic co-operation of all the units and arms present, so as to enable the whole strength of the force engaged to be put forth to carry out its leader's intention, as indicated by the governing tactical idea of the fight.* In carrying out this mutual co-operation, it has been hitherto always considered that the duty of intimidating and inflicting losses on the enemy at the longer ranges should primarily fall on the artillery.† But the unexpected circumstances of the Boer War, that really came as a great surprise to us, have unfortunately tended to temporarily discredit the value of the artillery arm among those who have failed to distinguish between the substance and its accidents. Even certain artillery officers have been similarly affected. Our artillery projectiles had inadequate fuzes that limited the ranges at which our guns could be used, our gunners had no visible objectives

* See *Combined Tactics*, 1902, section 1 (1).

† After guns have once got the range correctly, rifles cannot compete with them at long ranges in efficacy of fire. See *Combined Training*, 1902, section 18.

to fire at, our guns were far too few in number to produce an adequate effect, the enemy were hidden in trenches specially designed to nullify the effect of the shrapnel projectiles with which our field-guns were only provided, and the guns were rarely used so as to assist in carrying out any special dominant tactical idea determined on beforehand by the commander of the force. Thus everything combined to allow shallow judgments to temporarily cloud over the real value of our artillery fire. The result of this has been to raise a clamour in many quarters for a revival of long-range infantry fire, which had rightly been discredited in the past. If infantry has to prepare the way for its own assault, it is hard to understand why this preparation should be attempted at artillery ranges at which infantry fire is avowedly weak. If infantry has to prepare its own way, it should certainly do so at ranges at which its fire can have some real efficacy, and not at ranges at which most of its ammunition will most certainly be wasted.* The subject of the proper use of the artillery arm cannot be discussed here, but this revived interest in long-range infantry fire is worthy of serious study and examination.

At the outset, it may be pointed out that the modern rifle can send a bullet two miles† and can fire rapidly, yet those effects are but *secondary* ones, arising from the arrangements made to secure a flat trajectory

* See *Combined Training*, 1902, sections 18 (2) and 18 (3).

† See para. 278, *Musketry Regulations*, 1903.

at the shorter and most important or decisive ranges, and rapid loading. *The value of a flat trajectory* is to avoid the necessity of having to guess rapidly-changing ranges, and of having to continually change the back-sight elevation during the final onrush of a cavalry charge or of an infantry advance or bayonet assault; and *the value of rapid loading* is to lessen the time during which the rifle is not ready to fire, not to lessen the time required for aiming. All unaimed and rapid firing is usually so much waste of invaluable ammunition. And at long ranges the dangerous zone* is small, the accurate estimation of the range accidental, the observation of the fire difficult, and, unless a large number of rifles are accurately concentrated on the objective, the results of the firing, including ricochet effects,† weak, besides other disadvantages that will be considered presently.‡ Thus, *the primary qualities to be sought for in the infantry rifle are accuracy of the sighting, flatness of trajectory at the decisive ranges, and power of rapid loading.* And given these qualities, it is a misuse of the rifle to use them extensively for either long-range firing or for unaimed rapid firing.

* Information on dangerous zones or spaces is given in paras. 262 to 264, *Musketry Regulations*, 1903.

† See para. 279, *Musketry Regulations*, 1903.

‡ All the popular stories of men's hands, heels, drinking bottles, etc., being hit by single bullets deliberately aimed at them at ranges of 600 yards and over, where they could hardly even be seen, may be taken as inventions of the imagination. Earl Roberts states that 150 yards is the extreme distance at which it is possible to distinguish the head of a man firing from behind cover. See p. 148.

But, in forgetfulness of these facts, various demands have been made for long-range rifle-firing to be given a very prominent place in the training of our infantry, and hence for suitable ranges for such firing to be acquired. The late British *Musketry Regulations* provided for magazine volleys "at 1500 yards, if possible," and ordinary volleys at "about one mile, if possible,"* and on this the Indian authorities determined to go one better. In an Indian circular, dated the 27th of March, 1901, it is stated that, it—

"is sure that long-range fire, both individual and collective, will play a very prominent part in future campaigns, and instructions will shortly be issued, ordering individual practice to take place in British and native regiments up to 1800 yards if possible, and also collective practice up to the extreme range the rifle is sighted to," viz. 2900 yards.†

A previous Indian circular, dated the 22nd of March, 1901, states that—

"One of the facts which the war in South Africa has brought prominently forward, is the use and advantage of long-range firing."

* The present *Musketry Regulations* for British troops do not lay this stress on long-range shooting. The men are trained to fire at short ranges chiefly, i.e. up to 600 yards. Para. 172 says, "Long-range fire should be practised, but should not as a rule be undertaken by small units; the objective should be a prepared area of ground, or canvas screens laid horizontally on an area of ground not less than about 50 yards square at 2000 yards."

† See paras. 234 and 278, *Musketry Regulations*, 1903. It must be, however, admitted that in the *Annual Reports for Musketry in India* for 1900-01 and 1901-02, not much stress is laid on long-range firing.

and that the subject is to receive careful attention. Then, after pointing out the extreme ranges for which our carbines and rifles are sighted, the circular proceeds to state—

“It is manifest, however, apart from other considerations, that it is useless for men to try to shoot at such long ranges unless they are carefully taught how to aim and fire with extreme range sights. The eye, moreover, requires to be practised in straining to keep the sights on the mark at long ranges.”

Such a statement presupposes the frequent use of extreme long-range firing, and accordingly—

“It is requested that orders may be issued for all regiments and battalions, British or native, to practice long-range sectional firing up to the limit to which carbines and rifles are sighted.”

But the instructions that follow for such firing, and the experimental data that are given as an apology for it, are themselves, when analyzed, a sufficient condemnation as regards the use of such long-range firing.

“If the ground is soft enough, a space about 30 yards square* should be prepared, in which the strike of the bullets can be seen, or old canvas, the tops of tents, etc., can be laid on the ground, a few screens or figures or targets being put up in the centre of it for the men to aim at. . . . The range must be carefully taken with a range-finder, or measured off a map, and the strike of the bullets

* The size of targets required for getting results at long-range rifle firing is utterly unlike the widely scattered lines of hostile riflemen that form the most usual objectives in war.

watched through a telescope or field-glasses, so that the elevation and direction may be corrected as may be necessary, and officers must remember that wind and the state of the atmosphere have a great effect on the flight of bullets at extreme ranges."

That is, everything is to be done, even things that cannot occur in war, to secure good results. This may be necessary for teaching men, but no warning of any kind is ordered to be given them that the conditions under which they are firing are quite abnormal and exceptional, and therefore unlikely to occur in war.

The following self-condemnatory experiments are next quoted; the wind was very slight, and the weather clear and fine :—

"The value of this description of fire is shown by the following notes on some experimental firing which recently took place at Barkacha camp :—

"(a) L.-M. Mark I.* rifles, about 8 years in use. *Target 40 by 50 yards.* Distance, 2050. Elevation used, 2000 yards. Some picked marksmen, 50 per cent. of hits. Ordinary shots, 17 per cent., 20 per cent., and 30 per cent.

"(b) Distance, 2480. Elevation used, 2400. *Target as above.* Volleys by sections from various companies. Percentage varied from 6 to 13.

"(c) L.-E. Mark I. rifle, 1900. Distance, 2800. Elevation used, 2600. *Target 54 by 45 yards.* First volley, 7 hits. Second volley passed 50 yards beyond the target.

"(d) Distance, 2800 yards. Elevation used, 2500. Volleys and independent. Percentage, 28.

"(e) Distance, 2400. Elevation, 2200, increased to

2300. *Target 50 by 35 yards.* Volleys and independent. Percentage, 30.

"(f) L.-M. carbine, 1896. Distance, 2000. Elevation, 1700. Independent. Percentage, 30.

"(g) Distance, 2400. Elevation, 2100. Volleys. Percentage, 30.

"(h) Elevation, 2000 to 2100. Percentage, 16.

"(i) Distance, 2800. Elevation, approximately, 2400. Volleys. Percentage, 23.

"(j) Distance, 2800. Elevation used, approximately, 2400. Independent. Percentage, 16."

It is stated that "the distance was taken with a mekometer, which does not appear to have been very accurate," but there is nothing to show whether the accuracy of the mekometer was tested.* The discrepancy between the range and backsight elevation used appears to be attributed to the mekometer, and not to defects in the rifles, or to changes in the atmospheric conditions of pressure and temperature during the firing.† However, in the field, the mekometer would have to be relied on as accurate when it is used. The enormously large targets used do not represent the normal targets fired at in war, and the discrepancy

* Mechanical range-finding instruments are by no means to be trusted as infallible, and they further require to be used by well-trained men. See the *Annual Reports of the School of Gunnery for Horse and Field Artillery at Home*, 1901 and 1902.

† From Appendix II. it will be seen that a temperature of 90°, and a barometer pressure of 27 inches, would increase the flight of the bullets 180 yards when using the elevation for 2400 yards, which increase may have been made larger by a rear wind, inaccurate sighting, use of fine foresight, etc.

between the ranges and the backsight elevations used for them shows what a waste of ammunition would have occurred if no means existed for ascertaining this discrepancy, as would be the usual case in war. Further, it is universally recognized that the percentages made in war are but a small fraction of those made in peace practices; the Germans allow this fraction to be one-tenth, but other nations allow a much smaller one, *e.g.* the Austrians allow one-seventieth.

The circular proceeds to say—

“It is no use letting indifferent or moderate shots fire *individually* at long ranges, but all marksmen are to receive special training in long-range individual firing, so as to be able to put shot after shot into a bush, or over the top of a sangar (stone breastwork), at distances from 1000 to 1800 yards . . . with a view to keeping down the fire of the enemy's sharpshooters. That men may know where their shots are going, and so gradually get them on to the mark, a large screen should be put up behind a first-class target.”

It will be shown later that the natural “pattern” for the ranges named are such as will absolutely prohibit the ideal of accuracy, here laid down, ever being obtained; while the unknown allowance for drift prevents any possibility of accurate firing; and it is doubtful if the ideal laid down can ever be approached even with the aid of accurately adjusted telescopic sights and over known ranges.

The new provisional issue of the *Musketry Regulations for the Native Army in India* (para. 243),

admits that it is very easy to miss a target no bigger than a man's body at all ranges. It will be also shown later that any firing carried out *individually* is totally inadequate at long ranges, and that, at these ranges, the Boer efficacy of fire was attained by concentrated collective firing (see p. 116, *seq.*), combined with a keen eyesight and an extraordinary power of judgment of the proper backsight elevation to be used for the range. At the same time, it must be admitted that the circular is right in pointing out the need for the training of the eye for long-range vision, and the inadvisability of ever employing indifferent and moderate shots for long-range firing.*

The Commander-in-Chief in India, General Sir Power Palmer, stated at the Meerut Rifle Meeting of 1900 that a commanding officer of a regiment had told him that, on one occasion in South Africa, his battalion was "literally held up at 1200 yards for five hours by the Boer fire. The men had to remain lying down till darkness set in, as whenever a man moved he got knocked over." It would be interesting to know when and where this happened—for it is not by any means the normal experience gained in the Boer War,—and also whether the range was correctly stated. Nothing is said also about what formation the battalion was in. Other officers who have written about their experiences of the long-range fire of the Boers have stated that it was good when directed, not at individuals, but at a general

* Experiment (a) at Barkacha Camp shows this.

position; and they have also pointed out the three chief causes of this accuracy, viz. the extraordinary power that the Boers possessed for estimating the proper backsight elevations to be used, the extraordinary power of vision they possess, and the extraordinary clearness of the atmosphere in South Africa. The Boer fire decreased rapidly in value as the war progressed, that is, as their best men were gradually either shot or captured.*

It must always be remembered that the objectives in war are not always stationary. They may either be advancing, or retreating, or moving sideways, at different rates of speed, or they may appear for a few seconds only, and then disappear suddenly.† These conditions will still further reduce the efficacy of a long-range fire that depends on the observation of the strike of its bullets for getting useful results.

The truth of the matter is that *all firing in war is a matter of probability*, and we shall see this more and more clearly as we consider the conditions under which the rifle has to be used in war. And hence all that can be done in war is to endeavour in every way to increase as much as possible the probability or chance of hitting the enemy when the fire is once opened, and when the proper backsight elevations to be used have

* This same reduction in the battle efficacy of rifle-fire as the war progressed was markedly seen in the Franco-German War of 1870-71, especially on the French side.

† See *Infantry Training*, 1902, section 117, for the subject of firing at moving and vanishing objects.

to be guessed at. How this is to be done it is the purpose of the following pages to show.

We have already pointed out the necessity for the accurate sighting of our rifles, and the adverse influence, on the sighting of a rifle, of the gradual wearing out of the barrel by the bullets—the life of a barrel being taken at about 3000 rounds of ball ammunition. Now, the value of all fire depends upon its having a good chance of hitting the target aimed at. We say “a good chance,” because we know from experience that, given every favourable condition for accurate shooting, even from a fixed rest, no two bullets fired successively from a rifle will strike on the same spot; that a number of bullets fired under the same external conditions will form a group or “pattern” on the target; that the size of these groups increases greatly as the range increases; and that the size of the groups is considerably larger when fired from the shoulder than when fired from a fixed rest.* Unfortunately no information is available as to the size of these groups with our present rifles. But our *Musketry Regulations* lay down (para. 304) that we are justified in reporting a rifle or ammunition as inaccurate when, in a group of ten shots

* These groupings are due to variations in the “personal equation” of the firer, and to unavoidable variations in the ammunition fired. The more perfect the manufacture of the rifle and its ammunition, and the less variations there are in them, the smaller will be the shot-groups made at the different ranges. So long as a bullet falls within the average shot-group or “pattern” for the range, the shooting is good.

fired at 500 yards, there is a *mean* deviation of over 12 inches for a rifle when fired from a *table-rest*. This deviation, it must be borne in mind, is a mean radius, and presumes that many of the shots fired strike outside of it. Thus our regulations admit that a man can be missed at even 500 yards when fired at from a table-rest, and hence still more will this be likely when he fires from the shoulder and in the excitement of a fire-fight. This shows the small chance that exists for any accurate results being obtained from individual shooting at long ranges, even if the proper backsight elevation is accidentally hit upon, and more especially so when we consider the enlargement of the bore as more and more ammunition is fired from it.

Again, to possess a good chance of hitting at long ranges, it is very necessary to be able to observe the effects of the fire, that is, the fall or "strike" of the bullets on the ground. But this is what it is almost impossible to do, except under very exceptional circumstances, with the modern small bullet, and then only with the aid of a concentrated collective firing, and the use of field-glasses or telescopes.* In the exceptional soil and atmosphere of South Africa the fall of bullets could sometimes be seen with the naked eye at 1800 yards, and when field-glasses were used the fall of the bullets could be seen at even longer distances. But these conditions will not be repeated in other countries.

* These instruments should be carried by every officer and non-commissioned officer. (See para. 133, *Musketry Regulations*, 1903.)

Every officer who has had much experience of long-range firing knows the extreme difficulty of picking up the range by observation, and the numerous occasions when consequently no results whatever have been obtained on the target. Nothing can be seen of the bullets if they strike on soft, or damp, or grassy, or bushy, or rocky ground, or behind an undulation of the ground. Even artillery, with its relatively large projectiles, suited for the purpose and fired from steady carriages, is entirely dependent for effective shooting on the observation of the strike of its projectiles. But neither of these conditions obtain for infantry; the bullet is too small to be seen, and is fired from a yielding shoulder, which renders uncertain its point of fall. Moreover, artillery, with all its apparent advantages for using its guns individually, has found out by experience that the individual use of guns is the most certain way of nullifying the tactical efficacy of artillery fire. And if this be true for the artillery, with all its advantages for individual firing at long ranges, it must be still further true for the infantry weapon.

Individual long-range rifle-fire, owing to its high angle of descent, small dangerous zone, large pattern and unknown drift, is quite unsuited for use against the thin or shallow objectives that are the normal ones offered in war. It is only of any real value when directed against high, deep, and dense targets, and *then only when it is well placed, and when it is delivered from an adequately large number of rifles.* Experience, even

on the ranges, shows that as the range increases the number of rifles employed must be also largely increased to get similar results to those obtained at shorter ranges. The same principle applies to the fire of a single man—as the range increases he must be prepared to fire more and more rounds at each successive range before he will strike his objective, owing to the rapid increase of the size of the shot-grouping as the range increases and the greater angle of descent. It must be borne in mind that so long as a man's bullets fall within the limits of the shot group, suitable to the range and to the rifle and ammunition he is using, and also to his physical state at the moment of firing, he is shooting well.

As regards securing the fall of the bullets fired at long ranges being well placed, we are at once confronted with certain grave difficulties, such as (1) the accurate estimation of the range, (2) the effect of atmospheric conditions on the proper sighting, and (3) the effect of any inclination of the line of sight on the proper sighting for the range.

The first thing we want to know, whenever fire is to be opened beyond the short or flat trajectory ranges, is the exact distance of the target,* but this can only be found with any fair accuracy by means of a range-finder, or by inquiring from any neighbouring artillery in

* The subject of range-finding is dealt with in *Infantry Training*, 1902, sections 133 to 136. See also para. 162, *Musketry Regulations*, 1903, where it is laid down that the methodical estimating of distance is to be combined with all firing exercises.

action as to the backsight elevation (in yards) being used by them; but if these means are not available, then the range has to be guessed. This guessing process is given the dignified name of "judging distances," and a very inaccurate process it is. The average errors of even trained men in peace time, unexcited by the dangers of a fire-fight, have been found to be:—

At 300 yards, $\frac{1}{10}$ th	} of the estimated range.
At 600 yards, $\frac{1}{8}$ th	
At 1200 yards, $\frac{1}{6}$ th	

With untrained men the average errors are greater, and these errors, being averages, show that many of the guesses have still greater errors. Further, the errors increase more rapidly than the ranges—a condition which applies to mechanical range-finders as well. It is very little use to try and train the majority of men to judge distances over 600 yards. The more or less correct estimation of distances by eye is a gift (capable of cultivation), and so it should be entrusted only to those who show themselves to be possessed of the gift, when firing is begun at the medium ranges and over. In Germany the best six or nine men * at guessing ranges by eye in each company are made to guess the ranges, and to call out their several estimates to the company or section commanders, who then take the mean of the guesses

* That is, two or three men for each of the three sections into which a German company is divided. See also para. 162, *Musketry Regulations*, 1903.

as a basis for their orders. The estimation of ranges by eye is greatly affected by the condition of the atmosphere, the position of the sun, the shadows thrown by the clouds, the size and colour of the object viewed, and the character of the intervening space. The clearer and moister the atmosphere, the more the sun is behind one, the less broken the intervening space, the shorter the range appears to be; and *vice versa*. The appearance of distances may be said to change hourly during the day. In South Africa distances were absurdly under-estimated, while the Boers * possessed an extraordinary faculty of guessing, accurately by eye, the backsight elevations required for the ranges.

Now, knowing these facts, and knowing that guessing the range by eye is the only really available means of estimating them at all times, it is hard to see how long-range firing can be looked on as offering a good chance to produce effective tactical or demoralizing results, and especially so if we cannot observe the fall of the bullets. And this conclusion is all the more forcible when it is borne in mind that even if we do know the range exactly—which is rarely the case—it does not follow that we also know the backsight elevation suited to the range. The rifle is sighted for the normal atmospheric pressure found at sea-level, for an average

* Many officers deny that the Boers were any better at "judging" ranges than our own men, whenever they had not been able to ascertain experimentally the sighting required for certain prominent objects before the arrival of our troops. (See p. 77).

atmospheric temperature (about 60° F.), for still air, and for a horizontal line of sight. Consequently the backsight elevation to be used for a given range is affected by changes in the pressure and temperature of the air (which includes altitude above sea-level), by the force and direction of the wind, and by the inclination of the line of sight up or down hill.* The total allowance to be made for these factors increases with the range and with the inclination of the line of sight, and hence a long-range fire may be a mere waste of valuable ammunition† if the backsight is not properly adjusted, and if the errors made in guessing the range do not counterbalance the effect of any non-adjustment for the disturbing causes just mentioned. Another great difficulty experienced in South Africa was the effect of so-called "mirages" that occurred during the day, and which made the objectives appear to jump about; this difficulty also increased with the range. We have further to consider the effect of the daylight on the sighting. The duller the day the less clearly the foresight is seen, and the more of it is taken up when aiming, and consequently less elevation has to be used

* See Appendix II., and paras. 270 to 275, *Musketry Regulations*, 1903.

† In the South African War it was a common practice on both sides, when it was found that the enemy's bullets were falling short or over, for a man to get up and then fall as if shot. A party would then carry him away. This would make the enemy think that they had got the range correctly, and so induced them to continue wasting their ammunition in ignorance. But this could only happen when the "strike" of the bullets could not be seen.

than when the light is good and the sights clearly seen.* If the target is in shade and the sights lit up, a higher elevation is required than when the target is lit up and the sights are in shade. The position of the sun also affects the direction and elevation of the line of sight.

Another way in which the temperature of the air affects the shooting is its effect on the cordite charge of the ammunition. Any change in the temperature of the cordite increases the muzzle velocity about two feet and a half a second for each rise of 1° Fahr. Hence a rise of temperature not only decreases the density of the air, but increases the muzzle velocity, both of which factors increase the ranging of the bullet.

Ranges can also be found by means of special instruments called "range-finders." There are many in the market, but as they mostly require the use of two men and bases of several yards in length, they are of little use under modern battle conditions. What is wanted is a self-contained short base range-finder that can be used by a single man. Even the artillery have recognized the desirability of such a range-finder.† There are at present only two patterns of such a range-finder, viz. the Mallock and the Forbes.‡ The latter has been more fully tried than the former, and professes

* This reduction of the backsight elevation is particularly important in night firing. (See p. 319).

† See Annual Reports of the School of Gunnery for Horse and Field Artillery at Home for 1901 and 1902.

‡ See *Journal of the Society of Arts* for December 20, 1901, and vols. 30 and 46 of the *Journal of the Royal United Service Institution*.

to give very good results. But such a range-finder for infantry purposes should give ranges reliably up to 1600 yards to within an error of about 80 to 100 yards at the most; it should also be easy of working and adjustment, and hard to put out of adjustment, while being light in weight and portable, and capable of being worked by a man when lying down or behind cover. Range-finders require practised men to use them efficiently. Those instruments requiring two men to work them are never reliable, as we cannot be certain that the men will be ranging on exactly the same mark, which in war will often be hard to point out from being very indefinite in character.* Every battalion should have an officer who has been specially trained in range-finding, and whose duty it should be to instruct certain picked men in the use of the range-finder supplied.

The very best way of ascertaining, not the range, but the elevation for the range, which is the real information that is wanted, is to make use of trial volleys or concentrated collective firing. If the conditions are favourable for enabling the "strike" of the bullets being observed (see p. 69), then as an effective fire as it is possible to obtain for the range is secured, provided the men aim properly. If the conditions are not favourable for observing the strike, then, in the majority of cases,

* See Annual Reports of the School of Gunnery for 1901 and 1902. At Okehampton the ranges taken were often 1000 yards out! It is stated that "a one-man range-finding instrument is a necessity."

the ammunition is simply wasted, unless by a lucky chance the correct elevation is hit on. But this use of volleys requires practice, as also does the observation of the strike with field-glasses or telescopes from the firing point. A trained eyesight is most essential for this, especially at the longer ranges. The eye can be trained to respond more readily to the visual images it sees, and this is the case either with or without optical aids. The best results are obtained in this matter when the officers and men are trained to long and clear vision while they are young and their capacity for adaptability is still strong. Aiming is too often practised at clearly marked points in the barrack square only, instead of in the country at distant and obscure objects. This matter of the training of the eyesight is one of the most important of all connected with shooting, because the best rifle is of little use without the best and highest-trained eyesight to direct it and to observe the strike of its bullets.

It may be stated that, whenever the Boers had time to do so, they found the requisite backsight elevations for the prominent marks in front of the positions they took up by means of experimental trial. One man would go out as observer to a point as close as safety would permit to one side of the mark fired at; the others would then direct a concentrated collective fire at the mark, and the observer would signal whether the bullets were falling under or over, so that the correct adjustment of the sights could be made and recorded. Whenever

the Boers could not do this, and had to guess the ranges, their long-range fire was as ineffective as our own. The Afghans in the Tirah did the same as the Boers, with the same results.

So important are the two connected factors of the observation of fire effect and the correct estimation of the backsight elevation for the range, for obtaining a really effective fire, that it is worth while to seriously consider whether a special rifle should not be carried per section with special explosive ammunition, giving off a good cloud of smoke, for range-finding purposes. Such ammunition would be too heavy for many rounds of it to be carried, and hence would not be used for trying to secure direct tactical results, and the very few men who might be accidentally hit by the use of such bullets could hardly be used as an argument against their employment in the field. Indeed, to use them with a view to hitting a man or horse would be a wrong use of them, as the explosion of the bullet would probably not be seen if the man or horse was hit. The object should be to hit the ground only on which the tactical objective is located. Such explosive bullets were used for range-finding, with excellent results, in the Umbeylla campaign of 1864, before the St. Petersburg Convention agreed not to use explosive projectiles in battle when under half a kilogramme in weight, and only a formal notice of any proposed use of explosive projectiles under this weight is necessary to the contracting Powers.

Another point to be seriously noted is the great difficulty to be expected nowadays in battle, especially in the attack, of seeing anything to aim at and of knowing exactly where the enemy really is. When this happens, the difficulty both of estimating the range and of aiming is very greatly increased. The new difficulty of seeing modern tactical objectives is caused by the absence of any tell-tale smoke,* the use of inconspicuous uniforms or dress, the dispersed formations used by troops, and the use of natural and artificial cover, concealed, if possible, from view; and this difficulty increases with the range. Writing of the attack on Ladysmith, the special correspondent of the *Standard* said—

“As usual, it was impossible to see the Boers, so cleverly did they take cover among the stones. But their presence was made known by a continuous shower of lead, some of which did mischief at 3000 yards. Again, in moving from position to position, as in attack, there is no Boer mass to be seen. Single files or double files at 20 paces' interval, individual movement; ‘scatter boys,’ and rendezvous at a certain point, one mile, two miles, twenty miles away.”

Another important point is the great need for husbanding the ammunition carried by the men for use

* Efforts have been made to use specially coloured glasses (such as cobalt glass, or a dye of Hoffmann's violet dissolved in spirits of wine and painted on the inner side of the object-glass of field-glasses) to detect the products of discharge of smokeless powder. At present, however, very little success has been met with, but further experiments in a similar direction are much needed.

at the shorter and decisive ranges, at which experience shows it is impossible to supply them with fresh ammunition. Again and again in South Africa our troops often lay on the ground for hours, at about 800 yards or closer to the enemy, until nightfall, without any possibility of their emptied pouches being replenished, and without any possibility of being able to repel any infantry or cavalry charge the enemy might have made, and which would have been made by any other enemy than the Boers. And if the expenditure of the limited amount of ammunition that men can carry is begun at the longer and less important ranges, they will have to enter into the shorter and more important ranges with a greatly reduced stock of unreplaceable ammunition on their persons. The importance of this consideration will be increased with the probable introduction of automatic rifles in the near future.

Another point that we have to bear in mind is the fatigue caused by having to raise the rifle a great number of times in order to aim and fire.* In this process both arm and eye become greatly fatigued; and if the firing is begun at long ranges, it means a reduced efficacy of fire, other things being equal, at the more important medium and decisive ranges, especially if the men have been fatigued by previous severe exertions. The frequent construction of shelters under fire, the increased rapidity and duration of fire, and the great

* See pp. 276, 314.

exertion required in executing rapid and unnatural movements under fire, are severe tests of physical endurance, and require a correspondingly good physique in the soldier.*

We have so far assumed that the men are in a fit physical condition to make good shooting, provided all the other necessary conditions for good shooting are present. However, as a matter of fact, such a good physical condition rarely obtains in war. As a rule, the men are tired for want of proper rest or sleep, parched with thirst, hungry for want of food, and fatigued after a long march under a hot sun, or pouring rain, or high cold winds, over bad and dusty roads. In such cases their powers of shooting will fall off very considerably, especially in cases of prolonged firing, and the effect of this increases with the range.

There is still another important point in connection with long-range firing. Formerly, in the days of black-powder propellants, the smoke of the discharge of the rifle or gun gave a good visible mark to aim at in battle, but nowadays no such marks are to be seen, except the occasional and momentary flash of a gun, if it happens to be favourably situated for the observer, or the dust which its discharge causes to be thrown up.† Consequently, until objectives can be seen by the eye, it will be hard to bring an effective fire to bear

* See *Infantry Training*, section 250 (2).

† The Boers, to prevent this, either watered the ground in front of their guns, or covered it with the skins of slaughtered cattle.

upon them. Here we have raised at once the important question of the *eyesight of our men*. Our regulations take it for granted that the majority of our men have good vision, but this is far from being the case, and yet it is doubtful if a single man in the ranks ever wears spectacles.* It is nonsense to say that, in our regular army of about 250,000 men, there are none who require any aid to their vision. Mountaineers and seamen have a very much greater power of vision than men brought up in an enclosed country, and still more so than town-bred men who rarely have been accustomed to a longer view than down a short street. And these last two classes form the vast majority of our troops. In fact, it is doubtful if the majority of our men can really see well over 1000 yards until they have had some training in this matter. In this respect the Boers had an enormous superiority over us. General Buller has stated that the Boers could see our troops two miles further than we could see them, and this greater power of vision must have given them an enormous advantage both strategically and tactically. It must, however, be remembered that perhaps it is only in a South African atmosphere that the eye can distinguish objects at the great distances that have been

* Lord Wolseley stated a few years ago: "Taking a mass of men—because an army is a great mass of average men—I believe, out of every 1000 soldiers in any army, you will find that 10 per cent. cannot even see at 1000 yards, much less hit an object at that distance." Since the above was written the use of spectacles has been allowed. See para. 135, *Musketry Regulations*, 1903.

reported. The clearness and distinction with which distant objects could be clearly distinguished, owing to the phenomenal atmosphere in that land, was extraordinary, and is not likely to be repeated in other countries, especially northern countries.

For all the foregoing reasons, and especially in those cases in which it would be impossible to replace the expended ammunition, we see that long-range firing is a thing to be most studiously avoided, except in certain special cases to be dealt with hereafter. That some men are hit at very long ranges has no great bearing on the case, unless it can be proved that the man hit was the one aimed at. Most long-range fire is quite hap-hazard, the fore-sight generally obliterating the target with the slightest upward movement of the rifle, the pressing the trigger disturbing the exact alignment as so often happens, and the drift carrying the bullet to one side. In fact, one of the great lessons to be derived from the Boer War is *the extraordinary value of a short-range fire*,* especially when it had been carefully reserved, and the practical futility of all long-range firing against small and uncertain objectives at unknown ranges.† *In no case were our troops, when properly dispersed, ever prevented by the Boer fire from approaching to about 800 yards from the enemy.* At the Modder River, Magersfontein, Stormburg, Sand River, and other

* At short ranges the factors, already referred to, that have an adverse influence on accurate shooting produce but a small effect.

† See *Infantry Training*, 1902, sections 213 (1) and 250.

fights, when our troops were suddenly and unexpectedly assailed by a short-range fire, their advance was at once brought to a complete standstill, until either night came or the Boers were forced to retire under pressure from another direction. At the Sand River 3000 Boers kept 30,000 of our troops at bay for several hours at a short range of about 400 yards. Our difficulties only began when the short ranges were reached. If the Boers had only reserved their fire a little longer at Colenso, our leading troops would have been annihilated. It was only by the mercy of Providence that the Boers at Colenso opened fire when they did. It must be admitted that the Boer rifle-fire that checked us at Colenso was practically long-range fire—that is to say, it was delivered at ranges of 1000 yards and over. On the left, Hart's brigade was marched over the open in a dense formation, and got crowded up in a loop of the Tugela; on the right, the field artillery came into action in the open at 1200 yards from Fort Wylie, whose garrison had ascertained the range by practical experiment, and whose line of fire took the guns in flank. However, the guns remained in action for nearly an hour before they were silenced. In this fight the Boers were concealed, and, assisted by many mistakes on our part, kept us off with a heavy concentrated long-range fire, over known ranges, and aimed at large vulnerable targets placed visibly in the open. We could not but help being driven back under such very favourable circumstances for long-range fire that were offered by

ourselves to the Boers. On the other hand, the Boer long-range fire at Vaal Krantz produced no tactical effect whatever against our dispersed formations.

Thus, experience has fully shown that the fire-effect of modern rifles, in the hands of *undemoralized and trained men*, is so very great over open ground that it is impossible for extended troops to approach nearer to the enemy's firing-line in clear weather than about 800 yards. The passage across the final 800 yards,* separating the opposing firing-lines, is the *crux* of the attack. In the absence of suitable cover, no further advance can be made until either the enemy's riflemen have been demoralized, *i.e.* made so nervous as to make them incapable of delivering an effective fire; or some method of mobile artificial cover is made use of to protect a nearer advance; or advantage is taken of the darkness of night, or of misty or foggy weather, either to gain ground or rather cover to the front, or to charge home altogether.† These various conditions for enabling an attack to move forward over the shorter

* *Combined Training*, 1902, section 3 (3), apparently puts this distance as 1000 yards.

† See p. 17. The solution by a flank attack is omitted here, as the question before us is the advance to the front over the last 800 yards. Flank attacks are all very well, but, if they do not come as a surprise and are not supported by a powerful frontal engagement, they only result in making the enemy run away, before he is beaten, to fight us again under more favourable circumstances. This is what has happened in South Africa, where we were never able to bring the Boers to book in a decisive engagement. We can abuse the principle of flanking movements and attacks. See *Infantry Training*, 1903, sections 225, 226, and 218 (4).

ranges may be summed up in the terms, "Demoralization of the enemy," "Invisibility to the enemy," and "Invulnerability to the enemy's fire."

The following is a good instance of the uncertainty of long-range fire when the strike of the bullets cannot be seen. A battalion that had a good shooting reputation reported that on some days they had to expend a considerable amount of ammunition (twenty-four rounds fired by three good shots) before they could get on to a 6 feet by 8 feet target at 800 yards, because they could not see where the bullets struck the stone stop-butt in rear. If this can happen at 800 yards with a large visible target, the same is more likely to occur at longer ranges with far smaller and indistinct targets.

However, though it may be admitted that entire confidence cannot be put in long-range rifle fire, as an efficient means of "applying force," yet it should not be neglected, by troops in rear of the firing-line, wherever it is possible to use it with effect, because the material effects so produced, and the knowledge that such effects can be produced when conditions are favourable, gives a moral superiority which it is always advisable to make use of. Even rapid firing on a suitably large objective may be used at long ranges, so as to pour in as many bullets as possible while the objective is visible.*

* See para. 174, *Musketry Regulations*, 1903, in which the words "percentage of" should be replaced by the word "actual." (See p. 318.)

We cannot do better than conclude the subject of long-range infantry fire with the following quotations from General Bronsart von Schellendorf, based on the unrivalled experience of the Germans in all matters connected with artillery and infantry firing:—

“It appears that an exaggerated idea has been formed of the useful effects of infantry fire at long ranges. At long ranges, that is to say, at distances of at least 1000 or 1100 yards, we must represent the enemy in the open, but only offering a low target, disappearing at intervals. A reference to the Musketry Instructions* is sufficient to show us the effects that we can hope to obtain with the last rifle adopted. Now, a fire without useful effect is not only materially inefficacious, but it also increases the moral valour of the enemy. There is, therefore, nothing else to be done than to approach the enemy as close as possible without firing, in a judiciously chosen formation, until the losses compel a halt, or until such time as the directing officers begin to lose their power over the leading troops. At what distance from the enemy will this happen? This will depend on each particular case. However, it can be admitted that thin lines of skirmishers can be led forward, without a halt, up to 650 yards from a hostile line of fire, without firing themselves, or without being assisted by long-range infantry fire.†

“It is to the artillery that long-range fire belongs, of

* The German Musketry Regulations have tables showing the average efficacy of rifle-fire to be expected at different ranges and at different kinds of objectives, as ascertained from a very large number of peace experiments.

† In South Africa we found the distance to be about 800 yards; but, then, South African conditions are not likely to be found elsewhere.

which fact many dissertations, relating to the utilization of the infantry rifle as a weapon for long-range firing, have neglected to take into account. Our infantry rifle ought only exceptionally to be used as a long-range firing weapon.

"The real importance of the small-bore rifle resides, in a general way, not in the fact that it can be fired at long distances, but rather in the property which results from the greater flattening of its trajectory, viz. that, at a short distance, the bullets fly low. The flattening of the trajectory and the increase of the range of a rifle are undoubtedly intimately connected, but it is the first of these properties that is the most important and the most decisive. Hence, that which gives to our fine rifle, and to our improved instructions, all their value is the advance on the enemy, up to close distances, without long-range firing and without halting. Every halt in the advance which does not enable us to produce a useful effect is more prejudicial than useful. We know perfectly well that this is the case when troops are exposed to artillery fire. Does any one think that it is necessary to halt about 2700 yards and reply to such a fire, although the range of the rifle exceeds 3300 yards? No one would think of it. Why not, therefore, bear with calmness the normally feeble losses that long-range infantry fire may happen to inflict on us?

"If, when on some bullets arriving from the enemy's position, say at 1100 yards distant, every one is to throw himself on the ground, then it is necessary to point out that the prone troops will suffer, from artillery fire alone, more losses than they would have experienced, during the same time, from artillery fire and long-range infantry fire, if they had continued to advance.

"Therefore, once more let us say—advance without

halting towards the enemy up to about 650 yards from him, even under the most unfavourable circumstances."

Von Schellendorf wrote with reference to the conditions of European warfare, which will differ in many vital respects from the special conditions of our war in South Africa, especially in the matter of the enemy, the nature of the country and its atmosphere, and the employment of artillery. Von Schellendorf lays down the possibility of approaching to about 650 yards of the enemy, whereas we were only able to approach to about 800 yards without undue losses. However, the Germans rely on having six guns per 1000 to assist their infantry, and we had but barely half that proportion of guns to infantry in South Africa. It is important to bear this difference in mind.

The German Regulations do not lay down any particular distance at which infantry fire should be first opened. It only states that the enemy's position is to be approached as near as possible before firing at him.

"Well-disciplined soldiers ought to be able to hold their ground under the fire of the enemy without replying, when they cannot hope for any good result from their own fire. The invariable rule for the employment of fire is that the effect is only decisive when the enemy is near enough to be certainly hit. The judicious husbanding of the ammunition, especially at the long and medium ranges, is a necessity of the highest order, in order that the decisive success may not be compromised by any failure of ammunition."

The truth of the matter is that the use of the gun

and of the rifle have the same object in view; but this object is normally effected at very different ranges. As a normal rule, guns are for use at the longer ranges, rifles at the shorter ranges. Exceptional circumstances may temporarily reverse this rule, but then they form the exceptions, and are only temporary in duration. Infantry must be trained to the idea that the laurels of victory rest on the bayonet, and that the sole purpose of the rifle bullet and of the gun projectile in battle is to facilitate the bayonet assault; and hence we see the immense value of individual care in firing every bullet so as to promote the general cause and progress of the whole force. The Boer War has shown how grandly our brave and incomparable infantry have acted up to this ideal. But long-range firing, except by troops held in reserve, and then only under especially advantageous circumstances, is entirely contrary to the spirit of infantry, besides possessing all the disadvantages that have already been detailed, the most important of which is the futile waste of invaluable ammunition that is far more urgently required at the shorter and decisive ranges, where it cannot be replaced. Long-range firing is always the dream of the theorist, but it will be avoided as much as possible by the practical soldier in the field. No battle was ever won at long ranges, because the long-range fire of infantry can never be powerful enough to play a decisive tactical rôle in war;* it is the short-range fighting, including the

* In the fighting at Constantia Farm, a long-range action began on

bayonet assault, that decides ; and it is for this short-range fighting, from 800 yards and under, that the infantry soldier is armed, and for which he should be prepared and trained. Long-range firing should then come into his training as an experimental interlude, introduced at intervals, in case the men *may* have to be called upon to carry it out on some special and exceptional occasion.* But such occasions will never be those that decide a fight, and it is the decision, and the factors bearing on the decision, that should weigh most with us in the training of our infantry for war.

the 20th April, 1900, and lasted the whole of the 21st, the 22nd, and the 23rd April, in which we sustained few losses, but made no impression on the Boers. Other cases could also be quoted.

* Major J. E. Seely, D.S.O., has pointed out that long-range firing under peace conditions does not ensure effective results when it is used under war conditions. He has also proved by experiment that men trained on miniature ranges can hold their own when taken on to open ranges. The new Musketry Regulations have apparently accepted the principle that men who can shoot well at the short ranges can be trusted to fire well at the long ranges, though long-range firing does require some practice to be properly employed. See para. 111, *Musketry Regulations*, 1903.

CHAPTER V

INVISIBILITY

THE terrible efficacy, in clear weather and over open ground, of the modern magazine rifle in the hands of undemoralized and trained men is primarily due (1) to the use of smokeless powder, which enables the target to be always seen, so long as it is not deliberately concealed; (2) to the high rate of accurately aimed firing rendered possible by the use of rapid-loading expedients; (3) to the increased amount of ammunition that can be carried on the man nowadays, owing to the small cartridges in use; (4) to the very flat trajectory of the bullet up to 600 yards; and (5) to the efficacious dangerous zone (including ricochet effects) that exists up to about 800 yards at least over open and flat ground. But to enable any fire to be efficacious there are also two things, among others, that must be fulfilled, viz. (1) *the target to be hit must be visible so that definite aim can be taken at it*, and (2) *it must be vulnerable when hit*. And it is the absence of these two factors in a properly prepared defensive position that has apparently given the defence such a

preponderancy, for the time being, over the attack. We say "for the time being," because we were completely taken by surprise in regard to these defensive advantages, and have not yet had time to study how best to overcome them.

Visibility largely depends both on colour and on contrast of colour. By the use of karki* clothing, we greatly reduced the visibility of our troops in the field, to the disgust of the Boers, who were thereby unable to aim as well as they expected to be able to do. But the advantage gained by the use of karki clothing was often lost in the earlier fights of the war by the retention of regimental distinctive marks or colours, standing out conspicuously against the karki colour (such as black belts, dark great-coats, sporrans on kilts, bright metal ornaments, etc.), and which gave good points for the enemy to aim on. Even glazed leather should be made dull, so as not to reflect the sunlight. Consequently, before the Boer War had been long in progress, we find that all distinctive marks were removed, and that the officers were dressed and armed in the same way as their men. This latter detail was also necessitated by the Boer practice of telling off groups of their best marksmen† to fire on our officers only, in the reasonable hope that, their leaders being put out of action, our soldiers would retreat from not knowing what to do.

* An Indian term for "mud-coloured."

† It is said that some of their marksmen were provided with telescopic sights to their rifles.

This is an expedient worthy of imitation, because, again and again, in different wars, troops in the flush of a victorious advance have been checked and driven back for want of leaders. And we have a further lesson to learn from this, viz. to tell our men before entering into a fight what is expected of them, and to so teach them to act individually on their own initiative, and on right principles, that they will know what to do in order to advance the common cause in the absence of their natural leaders.

The colour of the clothing to be worn by soldiers in war should depend theoretically on the general colour aspect of the country operated in. But as this "colour" varies during the year in any one country, and as it also varies in different countries, and even localities, we have practically to adopt some general average colour for our uniforms. In doing this we must bear in mind that a mass or long line or band of colour, however dull, will be usually discernible wherever situated, from the very fact of the continuity of the coloured band; on the other hand, if a band of colour is broken up into various tints it is not easily discernible, and if presented in small patches, is usually hard to discern at all when motionless, even at short distances. A study of Nature emphasizes this fact. Wild animals and birds are rarely of uniform colour, and their colouring is often such that the lightest colours (even white) are found where the deepest shadows occur, thereby tending to counteract the effect of shade.

For these reasons, we can understand why the once-favoured mud-coloured clothing has gone out of favour. "Karki" has not been found to be so inconspicuous in South Africa as in the north-west frontier of India, and cloth of various greenish and bluish tints, and of mixed colours, like heather and Athol grey, has been suggested to supersede it. What is wanted is such an irregularity of colouring, getting lighter as the ground is approached, that will prevent any considerable patch of uniform tint being presented to hostile view. It would be even advantageous in war to make the men belonging to any given section wear uniforms of different shades of the general colouring chosen for the clothing. Guns splashed over with patches of such conspicuous colours as red, blue, and yellow were found difficult to locate in the open at ordinary artillery ranges.

But, however invisible the colour of a uniform may make its wearer while he is at rest, any movement on his part will probably at once attract the attention of a watchful enemy. Those who have hunted game will fully understand the value of remaining motionless when they wish to avoid drawing attention. Men lying unseen in the open are safer than men lying behind a visible shelter, for such a shelter attracts fire, which, if well-placed, makes the men behind it afraid of exposing themselves sufficiently to aim and fire. But men behind cover, especially if the cover is wisely constructed or utilized, possess the advantage of having

their movements concealed from the view of the enemy. Hence men should never fire *over* cover,* if they can fire to one side of it;† and if they have to fire over cover they should only rest their rifles, and not their elbows, on it, after first removing their headdresses, if these headdresses are likely to draw attention. In fact, a headdress placed on a stick, and moved about or up and down, is a device often used to draw an enemy's fire away from the place where the hidden defenders really are.

The effect of contrast of colours or background, as giving sufficient visibility to ensure good aim being taken by the enemy, must be considered when occupying natural, or constructing artificial, cover.‡ If the excavated earth of a trench is used as a parapet, and if it strongly contrasts in colour with the adjacent ground, then the parapet can be seen at a long distance. Moreover, parapets of the same colour as the surrounding ground are often shown up, at certain positions of the sun, by the different angle at which they reflect the sun's rays towards the observer. Hence in excavating trenches for a determined defence, this question of contrast of colour should be considered as well as that of the

* Sir Redvers Buller, in a memorandum on some field-firing at Aldershot, stated that the practice of men "bobbing up" over cover to fire, and "bobbing down" again to load, was a bad one. "Battles," he said, "are not won by Jacks-in-boxes."

† See *Infantry Training*, 1902, section 154.

‡ See *Infantry Training*, 1902, section 154 (6), and *Combined Training*, 1902, section 25 (1).

background. Men who can be seen on the top of a hill against a sky background would often never have been noticed had they remained motionless on the ground a little way down the front slope. On the other hand, these facts, concerning contrast of colours and sky-line effect, can often be used to deceive the enemy by the erection of sham unoccupied trenches, made purposely visible to the enemy in order to draw his fire in harmless directions.

Before leaving the subject of the influence of a contrast of colours, it may be pointed out that an artillery officer has stated that, in South Africa the presence of horses and of karki-clothed men was often clearly shown up at a distance on sunny days by the dark shadows that they threw on the bare ground on which they stood. Of course, all bits of polished metal, that will reflect sunlight, should never be worn on any part of the uniform or equipment or armament, either in war time or in peace manœuvres.

The South African War showed that many officers and men did not realize the importance of concealment of position, and that the stupidity or carelessness of a few men may bring severe losses on the firing-line, whether of infantry or artillery.*

Visibility is increased by the size of the target. A standing man is more clearly seen than a kneeling man; and a kneeling man is far more

* See *Combined Training*, 1902, section 24 (3), and *Infantry Training*, 1902, section 154 (1).

visible than a lying-down man. Groups of men also are more easily seen than single men, and the larger the group the more visible it is. These facts show the necessity for extended formations, when advancing under an effective fire, so long as the ground does not give adequate cover from sight, or so long as the enemy has not been reduced to such a "nervous pulp" as will prevent his being able to fire effectively. It must also be remembered that the groupings or patterns of the bullets of a rifleman (see p. 68), made at different ranges, increase with the range, and are always far wider than the width of a man at the longer ranges. Consequently, a single man will often be missed when one of a group of two or more men standing together would be hit. Any error in estimating the range will also assist in assuring the safety of the man fired at.* These facts also show the necessity for using extended formations when moving forward under fire, so long as the enemy's fire is efficacious. This conclusion is amply verified by experience. But when the firing-line halts under cover within efficacious range, it should be reinforced as strongly as the available cover permits, so as to bring the heaviest fire possible on the enemy; the supports should also be brought up as close to the firing-line as possible, to aid in resisting any possible counter-attack of the enemy.

As regards the attitude of the men under fire, in relation to visibility, they should employ the upright

* See footnote on p. 74.

standing position so long as the enemy's fire is not producing any marked results. After that the lying-down position should always be used, provided that, when lying down, the men can see the objective to be fired at. If not, then they must either kneel or sit down to fire, and lie down when loading or not firing, or else crawl forward to such a position as will enable them to see the enemy when lying down. When lying down, the nearest fold in the ground ahead should naturally be made use of.* When making the final bayonet charge, which supposes the enemy's fire to have been rendered reasonably harmless beforehand, the upright position must be used; and when opposing a cavalry charge, *i.e.* when there is no hostile decimating fire, the upright or the kneeling position should be employed, so as to allow of as rapid loading and aiming as possible.

It should be borne in mind that it is just as important for the supports and reserves to make themselves as invisible as possible as it is for the firing-lines;† and that in advancing against a position, concealment is just as important as when occupying a position.

But battles cannot be won by stationary troops. Forward movement, sooner or later, is essential for the winning of victories. And the quicker the pace of advance, the less the time the enemy has to aim, and the more rapidly the range changes. But as rapid

* See *Infantry Training*, 1902, section 158 (2, vi.). It is a most important part of a soldier's training to cultivate his eye for ground. See also *Combined Training*, 1902, sections 8 (1) and 22 (2).

† See *Infantry Training*, 1902, section 229 (3).

movements make the men lose their breath and their chests heave, such movements must be followed by sufficiently long periods of rest as will enable the men to recover themselves before they open fire again.* The method of carrying out these movements belongs to the subject of infantry tactics, and so cannot be fully considered here in detail.† But after a time, if the efficacy of the enemy's fire has not been sufficiently subdued, rapid movements in an upright position will have to give place to slow movements, made by crawling and creeping‡ from cover to cover. But such movements are by no means easy for men to carry out, when loaded with ammunition, food, water, rifle, and bayonet. In fact, they are very fatiguing, and require much practice, while ample time must be allowed for them; and, moreover, *the equipment of the men should be so designed as to admit of such things being done as easily as possible.*

The direction of movement is of importance, especially if the movement is a rapid one. The more lateral it is to the enemy's line of fire, the less a man is likely to be hit. But this kind of movement can only be made use of by single men, like scouts, who can have the free use of the ground they are moving over. Attacking

* See p. 183.

† See *Infantry Training*, 1902, sections 158, 220, and 221.

‡ *Crawling* is done on the hands and knees; *creeping* is done on the elbows and toes, with the body nearer to the ground. The chief difficulty in crawling and creeping is the carriage of the rifle, which has to be held in the hand or be slung from the neck.

troops must, as a rule, always move directly to their front, though occasionally they may be called on to make a flank movement in extended order, as happened during the fighting at Colenso, just previous to the relief of Ladysmith.

However, it must never be forgotten that extended formations, lying-down attitudes, the making use of ground and cover, crawling, creeping, and rapid advances by short rushes, *are only dodges to be resorted to when the enemy's fire demands their use*, in order either to secure as much invisibility as possible, or to shorten the time available for the enemy to aim in. *Intrinsically, these dodges are evils to be avoided whenever it is possible to do so.* There was no need for them when our opponents were the Arabs of the Soudan, or Zulus armed with assegais. And they would only be employed when it is necessary to avoid the greater evil of heavy losses arising from an effective hostile fire; and even then they would only be employed for just so long as that fire was effective, and no longer. Human nature is most strongly influenced by discipline when the men are held together in more or less closed formations (column and line), which also facilitate control over the men. Consequently, such closed formations will always be adhered to so long as the enemy's fire permits of their employment.*

* Isandlwana is a case in point, where a most faulty and disastrous use was made of extended formations, because the drill-book of that date referred to no other kind of battle formation!

The war in South Africa has brought to the front a serious difficulty in connection with the desire of the attackers for invisibility, and that is, the danger of unseen advanced lines being fired into by the friendly infantry and artillery in rear of them. There is often nothing to show nowadays where one's own firing-line exactly is, and on more than one occasion in South Africa the advancing firing-line suffered considerably from fire coming from its rear, though nominally directed at the enemy in front. In consequence of this, many writers on the Boer War have pointed out *the modern need of keeping up constant communications, by signals or balloons, or otherwise, between the widely dispersed parts of the engaged force*, so that each part may not only inform the others of its position and its need for help, when necessary, but also of the hostile objectives that one part can see, but which may be hidden from the other parts. This is a most important subject requiring much experimental practice, though very little consideration has as yet been given to it.*

Lieut.-Colonel A. Callwell, R.A., says—†

“The principle which should govern artillery co-operating with infantry in an attack is for the guns to intensify their fire gradually as the assaulting lines push forward, up to the point when the bombardment endangers the

* See *Infantry Training*, sections 211 (6), 228 (4), 248 (2), and 257 (2); and *Combined Training*, 1902, sections 10 (6), 10 (7), and 23 (7).

† *The Tactics of To-day*, pp. 13, 16.

infantry. The longer the fire can be kept up the greater is the chance of victory. But if the artillery is to perform its share of the task, it is imperative that the controllers of attacking infantry should keep constantly in touch with the guns, by means of signal or otherwise, especially in intersected ground. Scattered lines of [karki-clothed] foot-soldiers are difficult to see from a distance, the smokeless powder of to-day affords no indication to those in rear how far the assailants have advanced, and battery commanders cannot be blamed if they sometimes cease firing prematurely, for fear of hitting their own side, unless kept constantly informed of the progress of affairs. The arrangement of some well-considered means of communication between infantry in attack and the supporting artillery is the first step towards ensuring that each shall bear its proper share of the work in hand, and is essential if success is to be achieved over a stubborn and well-posted foe. . . . When an infantry unit ascertains the position of some concealed hostile guns—it may be owing to being shelled by the piece, or simply from detecting where it is by accident—the nearest artillery should be at once informed. Troops exposed to shell fire are too apt to assume that friendly guns in their vicinity are aware of what is going on as a matter of course. It is very difficult to locate hostile artillery, if skilfully emplaced, except from ground approximately in the line of fire. And one body of troops will often be quite unaware that another close by is suffering severely from the enemy's shells if these come laterally across the front. As the operations in South Africa progressed, the troops gradually learnt that if any long-range British guns were in the field, they could easily silence the Boer ordnance as soon as the position of the hostile pieces, hidden often with consummate art, had been discovered ;

and our artillery in consequence of this received most valuable information from other branches of the service."

And Lieut.-Colonel Callwell quotes the case of the capture of Monte Cristo, near Colenso, where the artillery was enabled to afford valuable assistance to infantry, five miles off, without seeing either the infantry or the ground which it was sweeping with its projectiles, owing to the infantry commander informing exactly, by heliograph, the officer in charge of the guns what he wanted done. The same principle should be made to apply to the assistance that infantry units may be able to give to each other. It is the force as a whole that is fighting, and every man and unit belonging to it should ever bear this primary fact in mind and act accordingly, and also the fact that the successful progress of any one part made in accordance with the general idea favours that of the others, and *vice versa*.

Invisibility is secured by hiding behind cover (a subject dealt with in the next chapter), and by making use of the obscurity afforded by foggy weather and night. The indefinite targets that we try to present to the enemy will make his artillery resort largely to concealing its guns and to firing indirectly over cover in front. And there is no doubt that, in future battles, the obscurity of night will be largely made use of in order to establish and entrench the troops executing frontal attacks in a more favourable forward position than they could reach during the exposure of daylight.

Suggestive proposals have been made from time to time for the attackers to create a thick smoke screen in front of the hostile defending firing-line by means of a suitable smoke-producing compound inserted in the artillery projectiles. This smoke screen would tend to reduce the fire-power of the defensive by preventing proper aim being taken, and thus enable the attack to approach with greater safety and fewer losses over open ground. In some cases the smoke screen might be made so thick and dense, by a suitable concentration of artillery fire on a given line in front of the enemy's position, that the attack could move up to this line unseen. It is almost needless to say that such a smoke screen is not bullet-proof.

The problem confronting all regimental officers in the future is the effective combination of the efficacy of their fire and the invisibility of their men with the forward movement required to either push the enemy out of his position or to take him prisoner.

The power that the enemy has of making himself invisible points to the necessity for, at least, every officer and non-commissioned officer being made to carry a good *field-glass* or *télescope* to aid his powers of vision. All officers should practise indicating indistinct targets to their men, by explaining the position of the target with reference to adjacent and conspicuous targets. The want of a systematic and clear method of pointing out indistinct targets is a fruitful source of delay and waste of ammunition. Troops on the march,

or when moving to and from their manœuvre-grounds, should halt, and practice picking up objects which may present themselves and estimate their ranges, correcting their estimates by reference to correct ordnance survey maps. This subject should form part of the annual inspection of companies, and be specially reported on.

CHAPTER VI

COVER AND OBSTACLES

*Cover.**

THE use of cover is closely connected with the subject of invisibility; we require cover from sight, as well as cover from the impact of projectiles. In the latter case, the cover must be thick enough or strong enough to resist the penetration † of the projectiles striking it. The folds of the ground should always be made use of to give cover from sight; they will also, sometimes, give cover from projectiles as well, as in the case of a deep ravine. Such natural features as large stones, ant-hills, small mounds, hedges, bushes, etc., situated on the ground, should be used for cover when they exist, but, unless they are proof against penetration, they will often be a source of danger if they attract hostile fire. When natural cover is absent, artificial cover must be provided. In its best form, such cover will itself be invisible, while, at the same time, hiding

* See *Infantry Training*, 1902, sections 113 and 154; and *Combined Training*, 1902, sections 20, 22 (2), and 25.

† For penetration of service bullet, see para. 277, *Musketry Regulations*, 1903.

the troops behind it from sight and protecting them from projectiles. The Boers were very skilful in constructing deep and narrow trenches that could not be seen by our attacking troops. They soon discarded skylines, on which to construct such trenches, for a position near the foot of sloping ground, conspicuous dummy trenches or banks of earth being placed higher up to attract our fire.* Whenever occupied cover can be seen, it will certainly attract hostile fire, and so should be proof against the penetration of the projectiles likely to strike it. If vertical shelters are used (walls, iron plates, etc.), they should be kept as low as possible, partly to make them more difficult to see, and partly to render them harder to be hit by common shell. An excellent form of artificial cover is four or five inches of gravel or road metal retained in position by boards, galvanized iron sheets or hurdles and stakes; but iron rails, piled on each other, and $\frac{1}{2}$ -inch iron or $\frac{1}{4}$ -inch steel plates can also be used when available.† Light steel plates will probably be used in the future in prolonged battles to form a movable artificial cover, to enable troops to cross a fire-swept open ground (see p. 137).

* See *Combined Training*, 1902, sections 25 (2), and 25 (3).

† As timber offers such small protection to modern bullets, it should be backed up by earth, sand, bricks, road metal, etc. Sacks of coal, at least 12 inches thick; compressed cotton bales, at least 22 inches thick; bags of commissariat supplies placed double; kerosene oil tins filled with stones and placed upright, or filled with earth or sand and placed on end; sandbags or empty cartridge boxes filled with earth and backed up with earth or bricks, etc.; earth or sand parapets, at least 30 inches thick, etc., can also be used.

The suggestion to provide a smoke screen has already been referred to (p. 105).

Cover should always, as far as possible, be sought for in depth and not in width, because of the angle of descent of projectiles. Consequently, narrow and deep cover is the best to use, where procurable.

The utilization of the earth dug out from the trenches requires careful consideration. If time is available, the trenches should be four or five feet deep, and provided with drainage, and the earth taken from them carted to some distance to the front or to the rear, to form dummy trenches.* This should especially be done if there is a green turf, or else the excavated earth will show up conspicuously against it. Where time is not available, the earth should be spread about, unless the trenches are very shallow; in the latter case an earth parapet in front is necessary, in spite of its disadvantages; in some cases it is possible to screen the trenches with bushes, grass, etc.†

* It was stated in the *Pioneer* of July 7th, 1900, that an officer had written: "Though the direction from which rifle bullets came could be more or less located, it was quite impossible to identify the actual trench fired from, as the Boers invariably made dummy trenches, perhaps a hundred yards or so above those actually manned. I fancy that very often our guns and rifles were directed on the dummy trenches. Similarly, with their single guns, I have seen myself a Boer gun fire the whole day and our guns trying to locate it, without success. It was most discouraging to our men; not a Boer to be seen throughout the action, and nothing to show where the fire came from. Their plentiful use of barbed wire also makes it very difficult for a bayonet attack to get home."

† See *Combined Training*, 1902, section 25 (2).

The parapets in front of a trench should be lowered whenever a man has to fire, so as to form "loop-holes" as it were for him to fire through, and not over the parapets. If a trench had to be dug along a crest or skyline, where loop-holes or heads would show up clearly, the Boers invariably put the excavated earth close behind the trench, in order to prevent this.

The drainage of all trenches should be carefully provided for, whenever rain is a possibility. The deep trenches used by Boers, without drains leading from them, were admissible in the porous dry soil of South Africa. In rainy weather, trenches cut in impervious soils would soon be untenable, if undrained. It was only where the ground was too hard and rocky to admit of deep trenches being dug, that the Boers made use of low stone walls.

The exact location of trenches is of great importance. They should always be so placed as to give the rifle-fire its greatest efficacy, because cover is a secondary consideration to fire-effect. The Boers were very skilful in this matter; their trenches were always so placed as to fulfil four conditions as far as possible, namely, to allow of the ground in front being swept with fire, to allow of the lines of hostile approach being flanked, to make the trenches flank one another, and to prevent the trenches being enfiladed by hostile fire. With these objects in view, the Boer trenches were usually placed well down the forward slope of the positions they

occupied,* sometimes even at the very foot of the slope itself, when they wished to avoid the chances of splinters from the rocky slopes of the position; the trenches were rarely run in a more or less continuous straight line, but were bent and curved so as never to present a long line to an enfilade fire, and yet to allow of the curves and bends flanking one another; the trenches were also often made in a series of short lengths for effecting the same ends. The Boers so thoroughly appreciated the value of flanking fire that even individual men tried to turn it to account, by preparing pits well sheltered to the front but allowing them to fire at objectives to their right and left, and leaving their own front to be guarded by the flanking fire of the other men to the right or left of them.

* The military crest line of a defended position usually alters with the distance of the firing position of the attackers. Thus C is

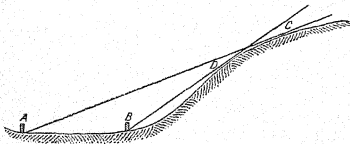


FIG. 1.

the military crest from A, and D is the military crest from B. The defenders' trenches should be so low down the slope as to give the attackers no concealment from view. Men in trenches at C could not see any one at the point B.

Trenches may be usefully constructed in rear of a crest-line for covering supporting troops, or even for the garrison of the firing trenches in front until the latter have to be occupied.*

Another point about which the Boers often showed considerable care, was the provision of covered communications from the rear to the firing-line in front, when open ground capable of being swept by hostile fire had to be crossed.† This was specially done wherever tiers of fire were provided for. Our neglect in providing such communications cost us many lives at Ladysmith, where the firing-line could often only be reinforced or supplied with food, water, ammunition, by a movement over the open; of course the night time can be used for furnishing supplies.

Lieut.-Colonel E. J. May, R.A., has pointed out ‡ the wonderful way in which the Boers mutually supported one another during an attack. One man would crawl forward devoting his whole attention to concealment, and while doing this his comrade behind him would attract attention away from him, and so cover his movement, by keeping up a brisk fire on our firing-line. When the leading man had found suitable cover to halt behind for a while, he would open fire and his comrade would join him with the same care. Lieut.-Colonel May writes—

* See *Combined Training*, 1902, section 25 (4).

† See *Combined Training*, 1902, section 25 (3).

‡ *A Retrospect of the South African War*, pp. 95 and 191. See also para. 164, *Musketry Regulations*, 1903.

"It was usually all but impossible to see the shooting-line of the Boers, but I am sure we never saw it being reinforced, because the Boers crept up cautiously one by one, crawling on the ground, dodging behind boulders, making use of every means of escaping observation which chance might throw in their way. And while one man thus pushed on, his comrade covered his advance from some snug corner to the rear, to which a hot burst of Mauser fire perhaps drew the hostile bullets. This mutual support, not only of units, but of individuals, is a marked characteristic of a Boer attack, and offers another object of attention to the instructor."

With us, on the other hand, advances were often made over the open, when depressions in the ground could readily have been made use of, and reinforcements nearly always tried to join the firing-line without making use of cover. Our troops require a far better individual training than has yet been given them in recognizing the cover that the ground offers, and in making use of it. So good was the mutual co-operation of the Boers that they would climb up a slope with those left at the foot of it firing with a relatively small margin of safety over the heads of those in front. But this can only be safely done by men who can retain their coolness to aim truly with properly adjusted sights.

Another point brought out by Lieut.-Colonel May is the necessity for troops to *at once* secure any ground that has been gained, by the throwing up of cover of some kind or other on it.

"Not only did the Boers in rear support with their fire those in advance, but they passed forward from hand to hand stones that could be built up into little, sheltering parapets. . . . Perhaps none of the lessons of our South African War is of greater importance than that one which urges troops who have captured a position to make it good at once against counter-attack. . . . Indeed, when a body of troops is launched in an assault, a special body of men,* in the case of a brigade numbering as many as a hundred, carrying tools, sandbags, wood, stones, or any other means of providing cover which may be at hand, should follow it closely with the view of taking vigorous steps to secure permanently what the fortune of war may have thrown in their way."

Obstacles.

The construction of artificial obstacles to the advance of the enemy is usually made concurrently with the provision of a clear field of fire. There can be no greater obstacle to an attack than a clear field of fire extending to 800 yards in front of the firing-line.† The primary object of obstacles is to delay, even temporarily, the advancing enemy, under an effective fire; consequently they should not be either too close to or too far away from the firing-line they protect, and they should not be either easily crossed, destroyed, or removed. The Boers

* These would presumably be military engineers, but the numbers suggested here appear to be rather low.

† In the fighting preceding the seizure of Spion Kop, our troops were for three days unable to cross a clear field of fire of about half a mile in extent in front of the Boer position, which latter was so situated that our artillery could not fire effectively on it.

made much use of barbed wire fences, which seem to be well adapted for the purpose, of checking the advance of even extended troops, unless the latter are amply provided with nippers, when wire fences would only cause a momentary delay. At night time, the Boers hung empty tins on their wire fences in order to give warning, by the noise made by them when struck, of any one trying to cross or cut the wires. Wire entanglements are not easily injured by artillery fire. In the wire entanglements around and connecting our block-houses in South Africa, electrical "tell-tale" wires were successfully made use of.

However, when erecting obstacles the defence must take care to leave any ground over which any counter-attack may have to take place, free from obstructions to such movement. Obstacles, therefore, are not altogether an unmixed blessing, because wherever they exist they will check the forward movement of both sides; and victory can only be won by forward movement.

From what has been said, we see that the use of the spade and the pickaxe to make artificial cover for protection from hostile sight and projectiles, and the use of axe and wire to clear the ground of cover for the enemy and to make obstacles to delay him under fire, should form an important part of the training of every infantry soldier.

CHAPTER VII

CONCENTRATED COLLECTIVE FIRING

HITHERTO we have, more or less, supposed every man to be firing to his direct front, that is, the case of a scattered or dispersed individual fire. But experience shows that, whenever practicable, it is of the greatest importance to direct all the rifles possible on some particular portion of the enemy's line, where he is developing or showing exceptional strength of special tactical importance for the time being. Such a kind of fire is a concentrated collective fire, and its use depends on a special characteristic that belongs to it. Now, suppose the statement is correct that, under field conditions of firing, an ordinary man will fire, on the average, about thirty shots before he will hit an upright enemy at 800 yards. Such a statement, however, presupposes that the enemy will stand still in the open long enough for the thirty rounds to be fired at him. But this would not happen, as the enemy would promptly get under cover as soon as possible, and so, to overcome this inconvenient procedure on the part of the enemy, we can make thirty men fire at once at the single foe, in

the hope that probably one or more of the thirty bullets will hit him. There are also other great advantages to be gained in thus acting, namely, that when the man fires thirty rounds at a single foe, a very large proportion of his ammunition supply is expended, and he has taken some time to do this, whereas when the thirty men fire together at the same man, they have only expended one round each and have obtained the desired result at once. Both ammunition and time are of the very greatest value in war. But there is also the further important advantage of the increased moral effect produced on the enemy, by inflicting losses on him rapidly in a short time. The greater the loss suffered and the more suddenly and unexpectedly it is inflicted, the greater is the moral and nervous shock, or demoralization, that it causes. A loss of 10 per cent. inflicted within a few minutes will probably stop, and even drive back, troops who would willingly endure a gradually inflicted 50 per cent. or greater loss spread over two or more hours of fighting. This well-established fact of human nature has almost invariably been overlooked when dealing with the losses suffered by our troops in various battles and combats in South Africa.

The foregoing paragraph completely explains the principle involved in concentrating a collective fire on certain stated objectives, and, from all accounts of the South African War, it appears that the Boers made a very prevalent use of it, while, on the other hand, we

do not appear to have hardly ever employed it, if at all. Still, on the other hand, it must be admitted that the Boers did not often give our men the opportunity of acting in a similar way, even if our men had wished to do so. We read again and again, in accounts of the fighting in South Africa, that after the advance of our troops had been brought to a standstill, and our men had sought whatever cover they could find, the moment that any one of our men showed his position by any movement on his part, he became the unenvied recipient of "showers of bullets" directed at him by the hidden Boer riflemen in front.

The peculiar characteristic of a concentrated collective fire, delivered from a number of rifles on to the same objective, is that it covers the ground struck (see Fig. 2) with falling projectiles for a depth of about

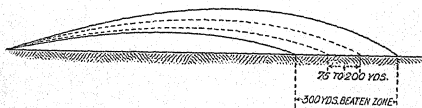


FIG. 2.

300 yards, if the ground and the line of sight are both horizontal, but the mass of the bullets (that is, about 75 per cent. of them) fall within the central portion or zone of the total "beaten ground." *The depths of these central zones are not constant for all ranges beyond the short ranges. They decrease in length as the range increases. They vary from about 200 yards at the*

600 yards' range to about 100 yards at the 1400 yards' range; after which they decrease to about 75 yards at the 2200 yards' range and over. In the absence of official data on the matter, the following formula may be taken as giving approximately the lengths of the central (75 per cent.) beaten zones for our present rifle at ranges between 600 and 2200 yards.

$$\text{Central zone in yards} = \frac{100,000}{\text{range in yards}} + 30.$$

The cause of this longitudinal spread of the bullets, fired by a number of men at the same target, is due to the fact that different men will not adjust their backsights to the same height, will not use the same amount of foresight, will not all have their rifles equally steady at the moment of discharge, etc. The lateral spread of the bullets of a collective concentrated fire is also much greater than that of the bullets fired successively by a single man, and this lateral spread also increases, as in the case of the fire of a single man, with the range. It is for this reason that the first extension of the men in an exposed firing-line must be decided by the lateral spread of a concentrated collective fire, instead of by the lateral spread of the fire of a single man. It is only after cover is reached, or after the enemy gets nervous or demoralized, and his fire becomes less deadly in consequence, that an exposed firing-line can be safely thickened by reinforcements.

The efficacy of a concentrated collective fire is often greatly increased by the *ricochets* of many of the bullets

falling in front of the objective, provided that the nature of the surface of the beaten ground is favourable for producing ricochets, and that the angle of drop, measured with reference to the slope of the ground, is not too great.* But, though we know that ricochets have a considerable effect in many cases, yet, as we have no means of controlling them, we cannot place any definite reliance on this useful effect being always obtained. However, the possibility of adding to the direct effects of a concentrated collective fire, by the effects of the ricocheting bullets falling short of the objective, is a powerful argument for the more general use of concentrated collective firing when circumstances are favourable for its employment.

The *Musketry Regulations for the Native Army in India* † say most truly—

“Fire, if scattered indiscriminately along an enemy’s position, can have little moral or actual effect on him, but, by being concentrated on one or more objectives, the moral force of the enemy is shaken. The surest way of checking an enemy’s advance, or weakening his defence, is to inflict sudden and heavy loss at the most threatening portion of his line, and the surest way of doing this is by concentrating the fire of a great number of rifles on that portion.”

This is a most important principle affecting the use of

* At 2000 yards many bullets will not ricochet off level turf; at 2500 yards only about five per cent. of the bullets ricochet off turf, and then only travel about 200 yards; at 3000 yards ricochets off any kind of surface are very rare.

† Provisional issue, 1901, para. 129.

the rifle in the field, and should, therefore, have a controlling influence on the selection of the objective to be fired on, and other matters connected with "fire direction" (see p. 167).

A memorandum, dated July 24, 1888, issued by Earl Roberts, when Commander-in-Chief in India, states—

"The concentration of fire by a particular group or section on a particular object is only a step in the right direction, being but one degree removed from unconcentrated fire. It is the direction of fire on one portion of the (hostile) position, undertaken by widely separated units, which constitutes the true essential of concentrated fire."

And it should be the object of all our tactical procedure and organization to admit of this ideal being carried out for as long as possible during a fight.

The German Regulations state that—

"In the fight of infantry against infantry, success depends, independently of the moral factors, on the superiority acquired by the concentration of the fire of the extended lines on the decisive points."

And General Bronsart von Schellendorf * writes—

"The infantry combat is normally decided by the effects of the fire; it is necessary, therefore, both in the attack and in the defence, to make every endeavour to acquire the superiority of the fire. This superiority can be obtained by the excellence of the weapon, a solid instruction in firing, and an energetic fire discipline; these are the *essential*

* *Considerations sur le combat d'infanterie.*

means. But it is equally necessary to bring into play the element of quantity, which, in war, plays a rôle that grows in importance as the inferiority of the enemy in regard to armament, instruction, and discipline becomes less. It is necessary, therefore, directly decisive action is determined on, to put the greatest number of rifles possible into the firing-line. This principle specially applies to the attack, which ought to compensate for the inferiority of its fire on the hidden objectives of the defence by firing a great number of bullets."

Then, while studying the means of acquiring this superiority of fire in the most usual case, that of the combat on a limited front, he is naturally led to seek for it in the concentration of the fire of many rifles, as ordered by the regulations.

"If the superiority of the fire cannot be acquired on all the front, or on a wing by an enveloping movement, we must try and gain, by the concentration of the firing, a partial (or local) superiority on certain points of the enemy's position. This principle has been, for a long time past, made use of by the artillery; and the ballistic qualities of the rifles in use facilitate the application of it by infantry. While utilizing the ground, it will often be possible to cover a part of the front of the enemy's position with fire; infantry should, like the artillery, be able to stand a fire on its front without replying to it directly, when required to employ its own fire on a point determined by the general interest. The superiority thus obtained over a part of the hostile line will determine the point of assault; or, inversely, when the point of assault has been recognized as the most favourable one, it is necessary to concentrate on it all the

fire possible, which will always be possible for the attack which possesses the initiative" (i.e. has taken the lead).

Thus, in the eyes of the Germans, the important factor of the combat is to acquire at all prices the superiority of the fire, either generally or locally; and their instructions in firing, their tactics, and their formations are all more or less subordinated to this leading principle.

From what has been said, we see that a concentrated collective fire is really a fire of probability, its object being to so cover the ground on which the enemy is situated with bullets as to make it very probable that some of the bullets will take effect. But the efficacy of such a concentrated collective fire, supposing it to be well placed, largely depends on the drop, and therefore on the dangerous zone, of the bullets, measured with reference to the line of sight; the less this drop, and the greater the dangerous zone, the better will be the effect of the fire. And so as the drop decreases and the dangerous zone rapidly increases (which happens as the range decreases), a concentrated collective fire also rapidly increases in efficacy as the range decreases.

The only case where a concentrated collective fire is unnecessary is when the objective is a long *continuous* line of men in more or less close order, and who are more or less parallel to the firing-line.

We have for the moment assumed that the "beaten ground" on which the bullets fall is parallel to the line

of sight, but this is rarely the case.* If the beaten ground slopes upwards with reference to the line of sight (Fig. 3), the extents of the total beaten ground

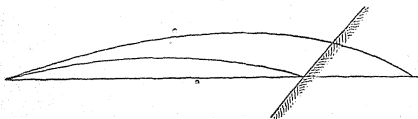


FIG. 3.

and of the dangerous zone of each bullet are diminished more and more as the slope increases in value; but if

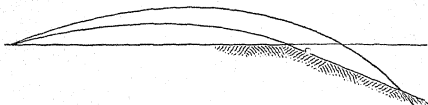


FIG. 4.

the beaten ground slopes downwards with regard to the line of sight (Fig. 4), then the extents of the total beaten

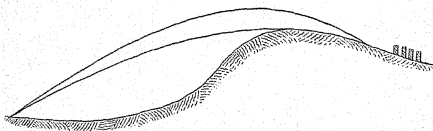


FIG. 5.

ground of the dangerous zone of each bullet are often greatly increased so long as the fall of the ground does

* See para. 280, *Musketry Regulations*, 1903.

not exceed the drop of the bullet. For this reason, if the ground behind a crest-line slopes gently to the rear (Fig. 5), it is often best, while the enemy are at a distance, to keep the troops in reserve well to the rear, if suitable cover cannot be found for them nearer the

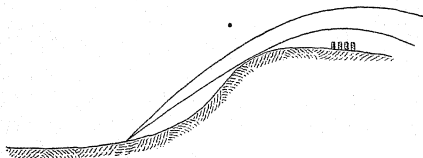


FIG. 6.

firing-line, and then, when the enemy approaches the crest-line, to bring them close up behind it (Fig. 6). If the ground falls sharply to the rear of a crest-line (Fig. 7), the reserve troops can be placed close behind

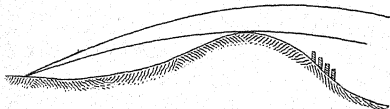


FIG. 7.

the crest-line from the beginning. The same principles hold good as regards the effect of the shape of the ground on shrapnel fire, since shrapnel fire is practically the artillery method of employing bullets. Fig. 8 shows how troops in a dispersed formation may be affected

by the slopes of the ground on which they be located.

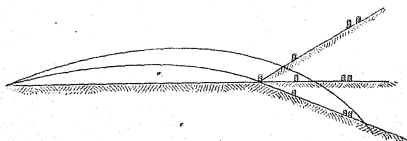


FIG. 8.

Fig. 9 shows how troops located on a high position lose the advantage of a grazing fire. The Boers in the earlier battles of the war began by holding high ground, but soon gave it up for low-lying positions. In the case of Fig. 9 the range must be more accurately known than in the case of Fig. 2.

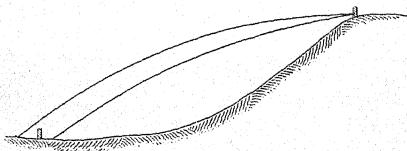


FIG. 9.

The effect of flattening the trajectories of rifles is to lessen the influence of the shape of ground sloping upwards as regards the line of sight, and to increase the influence of the shape of ground sloping downwards as regards the line of sight. This explains why the shelter afforded behind bullet-proof cover becomes more and

more safe from falling bullets as the trajectories of projectiles become more and more flat or less curved.

A knowledge of the proper backsight elevation required for the range is as essential for the efficacy of a concentrated collective fire as for individual firing, with the exception that an error of 50 or 60 yards in estimating the range in the former case has far less effect than in the latter case. There is no kind of firing that is exempt from the need of corrections being made for the local atmospheric conditions and the inclination of the line of sight. Consequently, it is of the very greatest importance to keep a careful watch on the results of every kind of firing in order, if possible, to see whether the bullets are falling about the target aimed at, so that we can either stop the fire if it is being wasted, or correct the backsight elevation, when necessary, if we can note where the bullets fall.*

It must be carefully borne in mind that training and fire discipline are as necessary for collective firing as for individual firing if the fire is to be effective or productive of tactical results. Cavalry charges can only be beaten off by trained and disciplined riflemen. There was a remarkable reduction in the efficacy of the French rifle fire in 1870-71 as the trained regular troops gradually disappeared.

The immense importance that attaches to the observation of fire, and to the fire-leaders being able to detect a tactical objective to fire at, shows the

* See para. 274, *Musketry Regulations*, 1903.

necessity for every officer and non-commissioned officer being provided with really good and powerful *field-glasses* or *telescopes*, which, however, must be conveniently portable and easy of use.

Another instrument of almost equal importance, for every company or troop unit, is a small handy *range-finder* carrying its own base (which should not exceed six feet in length), capable of being worked by a single man when lying down or behind cover, and sufficiently reliable to give a range of 1600 yards to within 5 per cent. at the most of the true distance. In action, failing such a range-finder, ranges can only be guessed by eye, the estimating being checked, when possible, by watching the "strike" of the bullets, or by making inquiries of any artillery or machine gun in action near at hand.* The Vickers-Maxim "pom-pom" gun, so much used by the Boers, proved of little or no value for tactical purposes, that is, in promoting the demoralization of the enemy, but, with its small bursting shell, it is likely to prove an excellent range-finder, allowance being made for its distance from the firing-line. From all accounts, the pom-poms in South Africa barked a great deal, but bit very little. At the Modder River they put out of action one of our machine-guns; at Colenso they killed about seventeen battery horses from a flanking position which should have been

* It has been found by experiment that the range engraved on the backsight used by the artillery should be taken, and *not* the range as given by the range-finder. The atmospheric and other conditions have much the same effect on artillery projectiles as on rifle bullets.

occupied by us; and at Spion Kop, where they enfiladed our position, they did a certain amount of harm. These apparently were the only cases in which the pom-poms proved of any effective use against us; but it must be admitted that on the very few occasions that we used these "glorified maxims," they invariably made the Boers bolt, though, on the other hand, we could never find that we had inflicted any particular loss on our opponents with them. If the pom-pom is to be used in future warfare, it will probably find its proper rôle as an infantry weapon, like the machine-gun. It is a good range-finder, and that is just what the infantry is very much in want of. However, as at present designed and equipped, it requires too many horses (six) to make it really available for infantry work. The use of the machine-gun as a range-finder has already been referred to (p. 57).

*Combined Sights.**

When there is any doubt about the estimate made for the backsight elevation for the range, or if it is considered necessary to cover a greater depth of ground than the central (75 per cent.) portion of the beaten zone with bullets, we can make one-half of the men (say alternate files) fire with an elevation for 50 yards at the long ranges, or 75 yards at the medium ranges, under the supposed range, and the other half fire

* See para. 282, *Musketry Regulations*, 1903.

with an elevation for 50 or 75 yards, as the case may be, over the supposed range. The Germans use this system of combined sights at ranges of 800 metres (880 yards) and over. But when this step is taken, it is advisable to concentrate the fire of an extra large number of rifles on the objective, in order to avoid a prolonged firing, and to get a tactical result as rapidly as possible. However, such a use of combined elevations means a proportionately greater consumption of valuable ammunition, in order to obtain a given effect rapidly, and so it should only be employed when there is ample ammunition, when the proper backsight elevation for the range is not accurately known, when the slopes of the ground near the enemy are unfavourable, when the strike of the bullets cannot be observed, and when the tactical results, if the fire is well placed, are likely to be commensurate to the ammunition consumed. These conditions for the effective use of combined elevations are so numerous, and are so unlikely to be concurrently present, under most circumstances, that it will nearly always be preferable to reserve the fire until the use of one elevation only for the range is likely to give satisfactory results.

CHAPTER VIII

INDIRECT FIRING, RESTS, TELESCOPIC SIGHTS, NIGHT FIRING, AND SHIELDS

Indirect Firing.

INDIRECT firing,* that is, firing over a screening obstacle in front at an enemy situated on the further side of it, cannot practicably be used with rifles except in siege warfare, because it requires a stationary objective, a knowledge of the angles of elevation for various ranges, and special arrangements of rests for aiming. But such firing can never produce results of any serious tactical importance, and so, with the greater flattening of the trajectories of the rifle bullet, we shall hear less about it in the future than we have in the past (see p. 318).

Rests.

On account of the deadly character of modern rifle-fire, most of the shooting in the medium and short ranges will be carried out from behind cover, or in the

* See para. 276, *Musketry Regulations*, 1903.

lying-down position. Consequently the use of cover as a rest for the rifle while keeping one's self concealed, is an art that must be carefully taught to each man individually, just as much as each man has to be individually taught to aim and fire.* The Boer War has shown us that every man should automatically be able to make use of cover for concealment and for increasing the accuracy of his shooting; and neither of these things can be properly taught to men collectively in sectional practices. Men should never fire over cover if they can fire from its side, and they should fire from that side of it which gives them most cover from hostile view. If one has to fire over cover, then the head-dress should be removed and only the rifle should be rested on it, so as to expose one's person as little as possible. Sir Howard Vincent, in a lecture on the Boer War, said—

“The bullets come, they find their billets; but what is there to fire at in return? Not a man to be seen. A tiny enclosure or groove in a trench, or on the top of a rifle-pit. A stone, yet behind it is a Boer rifleman. When he fires he does not stand up to fire by the word of command of a section leader, does not show a helmet over the top, does not place his shining barrel along the upper surface; it lies along the side. The right shoulder, right eye, and left knuckles are only exposed for a second or two. The stone still shelters the rest of his head. There is no smoke. Small wonder that, under such circumstances, few Boers are to be seen, that their loss has been comparatively small.”

* See *Infantry Training*, 1902, sections 113 and 154.

In our present form of shelter-trench the earth is thrown up in front, and a man fires over it, exposing his head and shoulders to do so. Sandbags are not generally available, but each man, if he has no material to make head-cover with, should hollow out of the parapet in front of him a place to fire through.

Hitherto the idea has been to make men shoot without any aids to aiming, except in special practices. But the Boer war has proved that in action, against modern weapons handled by a practised foe, there will be few occasions in which the soldier will have to fire except from behind cover, and he will invariably have to rest his rifle against an entrenchment, wall, rock, etc., or use it through a loophole. In the last rush upon a position he may have to fire standing and use rapid magazine fire; while in defending himself against a charge of cavalry or horde of savages, both the kneeling and standing positions will have to be resorted to. But it will be safe to say that 90 per cent. of the rounds expended will be fired from behind cover, or when lying down. In the attack, the fire will be delivered chiefly by men lying down; they will have to make their slow and perilous advance by short rushes, only using their rifles at the end of each rush. As Count von Sternberg says—

“The great mistake about target-practice is that, except at field-firing, the man shoots standing or kneeling. Target-practice should be carried out only in the lying-down position, and the targets should be very low.”

Experts in shooting know that firing with a rifle resting on a support is not such an easy matter as it looks, but once the knack of shooting in this manner is attained the results are excellent. Consequently it is most desirable that the trained soldier should be taught to fire under conditions that will be imposed on him in action. He will have to shoot, as has been said, in nine cases out of ten, lying down, exposing himself as little as possible, and resting his rifle on or against the cover which he has either made for himself or which is offered to him by the features of the ground. In the defence of forts, buildings, stockades, etc., the shooting will be mainly from loopholes, and here again much practice is required.* A good shot in the open often shoots very badly at first through a restricted loophole.

In order to increase the accuracy of the fire of a man lying down in the open, it is probable that the provision of a light "*rest*" attached to the under side of the rifle, preferably near to the magazine, would prove of great value, especially for men whose limbs have been made unsteady by rapid and fatiguing movements. With such a rest, a man lying down in the open would always have a support for his rifle to assist him in keeping it steady, when he had no solid cover to rest it against instead. Specially constructed rests of a solid character, with suitably placed small vertical

* See p. 291. It has been observed that when men fire from positions that are sheltered from the wind, they do not at first realize that the wind, which they do not feel, affects the flight of their bullets.

projections or cuttings to indicate the direction, can be made for *night firing*, so that by simply laying the rifles on them in the dark while firing from the shoulder, the ground in front can be adequately swept with low-flying bullets, instead of these, latter flying high, as they would probably do if fired from the shoulder only without the aid of such rests. A good rest of this kind is the top of a parapet with a suitable inclined superior slope—or the provision of parallel planks or poles giving the desired slope—and fired as usual from the shoulder. But more elaborate rests, which, however, must be sufficiently stable, can be made if considered desirable.

Telescopic Sights.

The importance of being able at times to bring an accurate fire on special visible targets (such as, on generals, or on staff or regimental officers, or even on gun detachments and teams) at a considerable range is so great that it would be well to provide some of the best shots in each company, with “telescopic” sights on their rifles. This would be peculiarly advantageous for troops on the defensive to enable them to pick off the leaders of the attackers, who are more or less indicated by their positions and behaviour on leaving cover to move forward. But it should always be remembered that a good knowledge of the proper back-sight elevation required for the range is necessary for all long-range shooting.

Night Firing.

The difficulty in getting any results from *night firing** arises from the impossibility of using the sights on the rifle for aiming^a in the darkness, and of even seeing the enemy until he has practically closed—except, of course, on moonlight nights, but even then the power of vision is very limited. On dark nights, short periods of partial illumination can be obtained by star-shells and rockets, but these periods are of more value for showing where the enemy is, and what he is doing, than for increasing the problematical efficacy of rifle-fire at night. The best plan, when possible, is to arrange such solid rifle-rests beforehand^f as will ensure the ground in front being swept with fire, when the rifles are laid on, and fired from, them. Where such rests are not possible, a rapid individual fire, kept low by fixing bayonets and keeping the muzzle down, must be relied on as soon as the enemy arrives close at hand. Where an electric light is available, the objective may perhaps be clearly lit up, but the difficulty of aiming still remains. When electric lights are used, they should be placed well away to a flank of the firing-party in order to enable the latter to see better, but this cannot always be done; the “direction” of the light or lights should be under the orders of the officer in command of the firing-line.

* See p. 318; and para. 281, *Musketry Regulations*, 1903.

Shields.

On account of the efficacy of modern rifle-fire, when directed by trained and undemoralized men, some writers have suggested providing troops with *light bullet-proof plates or shields*, capable of giving them cover in the open. But it is very doubtful whether they would be of any real use, in ordinary field-fighting, unless they were of such a size as would make them more or less heavy and cumbersome, and thus necessitate an increase of transport for their carriage. However, there are indications that point to the probability of battles lasting for more than one day, and to a more general use on the battle-field of the systematic methods of siege warfare. In such cases, it may be possible to bring up and make use of some kind of movable artificial cover, in order to avoid the necessity of troops having to dig for cover in cramped attitudes under a dangerous fire, and at a time when they ought to be firing at the enemy in order to demoralize him. The exertion of digging, moreover, does certainly reduce the accuracy of the fire of the man who has been digging.

An Italian critic has recently written *—

“After the reverse at Colenso, the appearance of the ground should have suggested a method of advancing similar to that selected by the enemy for defence, that is to say, an advance made by successive trenches and by

* *An Italian view of the Boer War*, by General Count Lucino dal Verme.

works of field fortification. Memory reverts to twelve years ago, when, after the disaster at Dogali, in Eritrea, General San Marzano was ordered to re-occupy Saati, and with only 14,000 men had to make a head against King John's entire army of 80,000 warriors. He advanced slowly, and making trenches every day, and supporting them with portable metal towers, and thus in three weeks he reached Saati."

CHAPTER IX

METHODS FOR ENSURING THE RAPID LOADING OF RIFLES

Now, considering the vast importance of an effective rifle-fire, it is essential that, when a favourable opportunity occurs for inflicting losses on an enemy, the fullest advantage should be taken of it. This, however, can only be done by rapidly loading the rifle by means of groups of cartridges temporarily held together by "clips" or by "carriers," also called "chargers."* It is now recognized that the magazine attachment of the Lee-Metford and Lee-Enfield rifles is not up to modern requirements. The British principle has hitherto been that our Lee-Metford and Lee-Enfield rifles should, as a rule, be only used as a single loader, the magazine attachment being resorted to only in cases of emergency when rapid individual firing is ordered. Hence the cartridges are not kept bound together in groups in

* The "carrier," or "charger," is a strip of tin that grips the cartridges by their projecting bases only; the "clip" is a tin framework that, more or less, grips the whole cartridge-case. The latter has been found the best for carrying in bandoliers, as the cartridges are better and more firmly held together.

the pouches of the men, but separate in packets of ten rounds each. These packets are broken up at the beginning of an action and the magazine charged. Now, it certainly gives confidence to the soldier to know that, all the time he is using his weapon as a single-loader, he has ten cartridges lying in reserve in his magazine upon which he can fall back when a critical moment arises, as when a sudden forward rush, either on his own part or on that of the enemy, takes place. However, the Boer War has proved to us that this is an inadequate use of the magazine, which is only a quick-loading device for as long as any cartridges are left in the magazine. If the enemy exposes himself sufficiently, *at any practicable range*, he should have showered on him as heavy accurate a fire as possible during the whole time that he exposes himself, and this can only be done by a continual use of the rapid-loading mechanism. In cases in which the enemy only appears periodically, the magazine should be at once recharged whenever the fire is relaxed for want of an objective to aim at.

If the magazine supply is to be only used to oppose a rush, it may happen, and will probably happen, that the rush may be checked temporarily, only to be renewed immediately afterwards. The magazine is then empty, and can only be refilled by taking the cartridges one by one, and pressing them down until the process has been completed. But this takes time,*

* At least half a minute under the favourable conditions of peace time, when the men are not flurried by danger.

and, meanwhile, the men so employed cannot fire at all. They have then to choose between using their rifles altogether as a single-loader, with an empty magazine, or to cease firing until they have recharged their magazines. Further, in hot engagements many men will not have sufficient restraint over themselves to remember the orders about keeping the magazine supply intact until the signal is given for magazine fire. There will always be occasions, such as the sudden Boer assault on Waggon Hill, outside Ladysmith, when the men cannot wait for instructions; their one object will then be to pour in as hot a fire as possible in order to check their assailants. It is on critical occasions like this that the defect of the Lee-Enfield magazine attachment becomes very marked, particularly if the enemy has a rifle that can be quickly recharged by means of clips or carriers carrying five or six cartridges.

It may be pointed out that, though a rapid fire may not give as high a *percentage* of hits as a slower and more deliberate fire, yet, with the greater number of bullets fired, it will often, if not too wild or too high, give a greater *number* of hits, which is the essential thing to attain (see p. 318). Hence it is an enormous tactical advantage to possess the power of being able to deliver a rapid fire, reasonably well aimed, and kept low, at important critical moments. For rifles that have to be lowered after each shot to be reloaded, six rounds per minute is perhaps about the maximum

rapidity of fire for effective individual firing, while 10 rounds per minute is quite the maximum for any collective firing that is to produce tactical results.*

The chief disadvantage of clip or carrier loading is that the rifle can never be used as a single-loader; each shot fired means one less cartridge in the clip or carrier, and a man cannot take count of the number of shots he has fired, though the last shot shows him that the clip or carrier is empty. Again, the expenditure of ammunition may possibly be greater when the reloading can be so quickly carried out, because an excited man may "loose off" his six rounds, insert another clip or carrier in a very few seconds, and continue firing, regardless of the limited supply that he is carrying, and which cannot be replenished. But the advantages of clip or carrier loading far outweigh their disadvantages. In the first place, the men have not to trouble themselves about thinking whether their magazines are empty or full, nor have they to think of what may happen while they are hurriedly thumbing in cartridges.† A man starts into action by simply dropping into the breech of his rifle a clip or carrier with six cartridges in it; his weapon is loaded, and he can use it deliberately, whether he is told off for individual sharp-shooting or for

* See p. 215 for further remarks on rate of firing.

† Lieut.-Colonel May has pointed out that when a Boer behind low cover wanted to reload his weapon he rolled on his back, and so did not expose himself, whereas our men were in the habit of raising themselves to reload, and thus exposed some part of their bodies to be hit.

collective firing. If it comes to fighting at close quarters, the repelling of an assault or of a sudden charge of cavalry, he can reload quickly enough, and each act of reloading will give him a chance of firing six shots rapidly. Consequently, given adequate means for supplying the firing-line with ammunition, and the army in the field as a whole with cartridges in abundance, as the Boers managed to do, the advantages are greatly in favour of clip or carrier loading as against that of the magazine attachment of the Lee-Enfield pattern. And it is satisfactory to learn from the Secretary of State for War that "experiments are being made with a view to improving the process of replenishing the existing magazine."

Of course, clip or carrier loading tends to increase the expenditure of ammunition with undisciplined or excited men. But after our experience of the rifle-fire of the Boers, who mostly made use of both clip and carrier loading, there can be no doubt but that clip or carrier loading is a necessity to enable troops to secure the highest results, and that with the higher individual training of the men, that every one now recognizes as a necessity, there need not be much fear of a wasteful increase in the expenditure of ammunition in battle.* Indeed, many are boldly advocating, and rightly so, the adoption of *automatic rifles*, some of which are only

* This fear has been expressed about every past improvement in the rapidity of firing of the rifle. For the experience derived from the Boer War, see p. 152.

self-loading, while others are both self-loading and self-firing for as long as the cartridges in the magazine hold out. Whether there is any automatic rifle yet on the market fitted for military purposes is another question. However, such rifles should be carefully watched and experimented with, even though present financial reasons may have to make us content with a present provision of a carrier or clip loading device for our existing and new rifles. The introduction of an automatic rifle will necessitate an improved fire-discipline, but this is a condition demanded by every improvement that has yet been made in the rifle, and we cannot yet say that we have reached the possible limit of fire-discipline.

It is the successful adoption of the automatic principle to the Mauser pistol that has brought about its application to the rifle. The aim of inventors has been to produce a rifle enabling a man to fire several rounds rapidly without lowering it from his shoulder. Their endeavour has been to make the mechanism of the rifle do everything but the actual aiming and the pressing of the trigger. The automatic rifle invented by the Italian Captain Cei-Rigotti can either be fired slowly, shot by shot, or, by an adjustment, it can be made to fire off all the rounds in its clip-magazine at the rate of fifteen rounds a second by a single pull of the trigger; special clips holding twenty-five rounds can be used with this rifle. The automatic rifle invented by the Swedish Lieutenant Friberg is said to have given good target results when fired at the rate of fifty rounds in

three minutes, though it can be fired quicker. As this invention can be adapted to existing rifles, it is being experimented with in Germany and Austria. The French are experimenting with an automatic rifle invented by an Italian watchmaker named Lamacchia, living near Toulon. It carries nineteen rounds in its magazine. In England a Mr. Simpson has invented a machine rifle capable of firing a hundred rounds a minute; it weighs about three pounds more than the present rifle. Now, there is a limit to the rapidity of fire required, for it is only a waste of ammunition to hit a man with more than one bullet before he falls, and if the first one is ill-directed, it is certain that the remainder will be more so, since the muzzle of the rifle is almost certain to rise gradually while the stream of bullets is being automatically discharged from it, and there will inevitably be the very certain result of an enormous *waste* of ammunition (see p. 216). Moreover, a rifle firing fifteen rounds a second, or even a hundred rounds a minute, will require a very firm hand to hold and restrain it so as to assure a fire of any reasonable effectiveness. Automatic rifles naturally heat the barrel excessively during their rapid automatic firing, but this disadvantage can be minimized by the use of an asbestos or wooden hand-guard; on the other hand, the shock of their recoil is very slight, from the recoil being absorbed in working the automatic loading mechanism.

The enormous supply of ammunition that would be required to meet the demands of automatic rifles

automatically loaded and fired, will be certain to cause a limit to be placed on their rapidity of firing and magazine capacity. Consequently, it is probable that the rifle of the future will be about a ten-shot automatic-loading rifle, requiring every round to be fired by pressing the trigger, because unaimed firing is nearly always useless. But whatever may be the rifle our men may have given to them in the future, the chief thing for us to look to is that the British soldier is perfected in the use of his existing weapon—which, on the whole, is a very good one—for unless men can shoot straight, keep cool, and obey orders, the adoption of automatic-loading rifles, or of rifles with magazines carrying a very large number of rounds, will only result in a useless waste of an enormous number of invaluable cartridges. *Increased skill in shooting and increased fire-discipline are necessary concomitants to increased power of rapid loading and rapid firing.*

We have heard a good deal about the introduction of a *new rifle* into the Army, and it is to be sincerely hoped that with it we shall also have the clip, or carrier, or, better still, an automatic method of loading. We were again and again checked by the heaviness of the Boer fire, and it was the clip or carrier loading in use by them that enabled them to pour this heavy deterrent fire on to our advancing skirmishing lines, and to make a frequent and effective use of concentrated collective firing. We have been so wrapped up in individual firing, over known ranges, and the “pot-hunting”

that it leads up to, as to become blind both to the possibilities of a proper use of concentrated collective firing and to the essential factor, for all effective firing, of a correctly adjusted backsight elevation for the range, as modified by atmospheric conditions and the inclination of the line of sight. What has been said about the protection of the foresight, "draw-pull" triggers, "rests," and "telescopic sights" should be made to apply to any new rifle that may be introduced.

In South Africa much inconvenience was felt from the intense heating of the barrel of the rifle after much firing, especially after any rapid firing. This points to the need of encasing the whole barrel to within a short distance of the muzzle.

Another point affecting the shooting of the men, that may perhaps be considered with the introduction of a new rifle, is the design of *the stock*. The straight stock of uniform pattern, that is invariably used for our rifles, is a great drawback to the good shooting of the majority of our troops, and it is therefore to be hoped that some attempt may be made to "fit" the new rifle to the men who have to fire it. Just as there are different sizes of boots made for different men, so there should be stocks of different lengths and bends. Tall men and short men, men with long arms and necks, and men with short arms and necks, are at present all expected to shoot equally well with a sealed pattern stock. Every sportsman and gunmaker knows that, to secure good shooting, the gun or rifle must "fit" the

man who uses it; if it does not, then the chances are greatly increased of the shooting going wide, or too high, or too low.

This question of the length and bend of the stock has also a very strong influence on the important subject of accurate *snap-shooting*,* at very short ranges of from 150 to 50 yards. When the final advance to the bayonet assault is begun, there can be no more halting to fire except for a bare moment, if the vigour and dash of the assault is to be maintained, and the men must therefore make use of snap-shooting while moving forward. But the snap-shooting of our infantry in South Africa was miserably deficient in accuracy for want of practice in it in peace time. An officer who held a high command in South Africa writes—

“Our musketry has shown up well in South Africa, with one very important exception, *i.e.* snap-shooting at short ranges, from 150 to 50 yards. If the Boers got to within that range, they shot us and we could not touch them, but from 800 to 400 yards we were better than they.”

And, again, Earl Roberts stated at Bisley, in 1901—

“We found that while our style of shooting was most effective at the longer and medium ranges, it had no chance with the Boers at 150 yards or under, the extreme length at which it is possible to distinguish the head of a man when firing from a trench or under cover; and in order to practise our men to be good shots at these closer ranges, we must teach them to fire very rapidly, and to take most

* See *Infantry Training*, 1902, section 118.

careful cover after each shot, so as not to stand long enough for the enemy to take a shot at them again."

In consequence of this, especial attention is now being wisely paid in our Army to snap-shooting over very short ranges, and at such small vanishing targets as will compel the men to take rapid aim. The subject of accurate snap-shooting has grown in importance with the use of rifles having a magazine attachment, and it will be of still greater importance when clip or carrier loading magazines and automatic-loading rifles are introduced into our Army, if ammunition is not to be wasted in the decisive crisis of a battle or fight.

CHAPTER X

AMMUNITION SUPPLY *

BEFORE passing on to consider the use of the rifle in action, it will be useful to first consider the question of the *supply of the ammunition* that is to be fired away. Experience has shown that, under an efficacious hostile fire, it is practically impossible to replace expended ammunition, unless the cover afforded by the folds of the ground is exceptionally favourable for enabling supplies to be brought up to the firing-line.† Consequently we see how extremely important it is that, if we are going to train our men to act and fire more individually than in the past, we must habituate them to carefully weigh the value of every round they fire, and to ever bear in mind the vital necessity of being economical in the expenditure of their practically limited supply of ammunition for the time being.‡

* The official regulations for the supply of ammunition are given in *Infantry Training*, 1902. The reader is also referred to the author's *Infantry Fire Tactics* for a fuller discussion of the various means that have been proposed for supplying rifle ammunition in battle. See also note on p. 160.

† See *Infantry Training*, 1902, section 152 (4, ii.).

‡ See *Infantry Training*, 1902, sections 161, 213 (3), and 250.

This should be part of the "fire-discipline" that should be instilled into them. And the men should be fully trained to cease firing on hearing the sound of the *whistles* that should be carried by every officer and non-commissioned officer. It should be a positive order that no soldier is to act on a *bugle call*. On one occasion, at all events, a bugle on the Boer side sounded our "Retire" at the moment when our troops were moving forward in the buoyant excitement of a successful bayonet rush, and our men were beginning to respond from habit, when a British boy-bugler, in a moment of anger or inspiration, retrieved the situation by sounding the "Advance." Similarly, an enemy might cause the "Cease fire" to be sounded. Hence bugle calls, if made use of at all, should be looked on as a means of conveying orders to the officers only.

No statistics have yet appeared as to the expenditure of rifle ammunition in the various battles in South Africa, but it must have been very considerable, because troops provided with 150 to 200 rounds each had, in many cases, used them all up before long, apparently without much injury to the enemy,* and had to remain for hours on the ground lying still, unable to do anything to assist the progress of the fight, and who would have been in a dangerous plight had they been then charged by hostile infantry or cavalry.† The

* The Boers also appear to have fired a very great number of rounds to every man hit on our side. Colonel de Villebois-Marcueil was not impressed by the Boer shooting.

† At Omderman, even the most disciplined troops fired away

battles in South Africa often lasted for hours, in some cases for ten hours, and if the troops in the attacking skirmishing line have to fire for this period of time, the question is, how are they to be supplied with the necessary ammunition? As a matter of fact, our troops did not fire continuously all the time, but only at intervals, and it was some time before they learnt to husband most carefully every cartridge that they carried. Experience alone brought its lesson of thrift in expending ammunition. As Lieut.-Colonel Callwell, in his work on *The Tactics of To-day*,* states—

“The battalions in South Africa which had passed through the long series of fights (from Colenso to Pieter’s Hill) were, by the time they joined hands with Sir George White’s garrison (in Ladysmith), so thoroughly seasoned in the art of modern infantry warfare that each man knew almost by instinct what to do, what to fire at, and how far the ammunition carried on his person could be expected to go. He had learnt how, from some point of concealment, to bide his time till he could shoot with effect. And when the plot was thickening, and the enemy’s bullets rained around, he could be trusted to maintain an aimed and rapid fire in the right direction, and to add his quota to the storm of lead under which his unit made its final rush.”

Earl Roberts also stated at Bisley, in 1901—

“In fact, the soldiers do not waste their ammunition almost all they had in a very short time, and yet they were not suffering from any efficacious hostile fire. A crack British brigade is stated to have fired away 300,000 rounds in a few minutes.

* P. 79.

under the excitement of battles as was expected they would do, for they rapidly found out that their own safety depended on their ammunition being most carefully husbanded."

This is an admirable picture of the individualized fire-discipline that is to be hoped we shall be able to instil into our troops in the near future. Under such conditions we need have no fear of any undue increase of expenditure of ammunition arising from any future improvements for increasing the rapid loading and rapid firing of the infantry weapon. But Lieut.-Colonel Callwell also draws another picture, which we hope is only a temporary and local one, never to be used by our troops again—*.

"It has been found in South Africa, after much experience by regiments which have been hotly engaged in many combats, that the most effective method of driving the Boers from their generally well-chosen ground is to pour fire in the direction of the spot whence the hostile bullets appear to be coming.† The enemy is often quite invisible. The exact position of the hostile marksmen can only be guessed at. But the rain of bullets does its work. No great loss is probably inflicted on the sheltered foe; but the moral effect of the incessant ping-ping around each lurking-place is more than the average Boer can stand. The expenditure of ammunition involved in this method is enormous, but it achieves its purpose, and it is generally more than justified by the event."

* *The Tactics of To-day*, p. 77.

† This practice is quite contrary to what is said in *Infantry Training*, 1902, sections 152 (4, ii.), 155 (2), and 155 (4, i.).

This conclusion, and the experience it is drawn from, are both unsatisfactory. Did the regiments referred to ever try to think the matter out, or was their practice forced on them by their being, as was so often the case, sent forward in an injudicious and ill-considered manner? The method stated to be adopted may have achieved its purpose, but that does not prove that it was the best method that could have been made use of, considering the admittedly enormous expenditure of ammunition that it entailed.* Lieut.-Colonel Callwell goes on to say—

* The same thing happened at Plevna in 1877. Captain Herbert, in his work on *The Defence of Plevna*, writes: "I had witnessed quick-fire drill at Widdin; but I venture to say that it was not until after the first battle that the officers became really conscious of the terrific power of long-sustained quick-fire. Our orders were, briefly, as follows: 'As soon as you know or suppose the enemy to be within range of your rifles, cover the space presumably occupied by him, or presumably to be traversed by him, with quick-fire, independent of distance, deviation, difficulty of aim [black smoky powder was then in use], probability of hitting, and consumption of cartridges.' The awful effect upon the opponent of this rule, if carried out as literally and as much *con amore* as it was by the Turks, is apparent in the Russian losses, and in the fact that throughout the Plevna campaign the Russian attacks [carried out with close and dense masses of troops], with few and unimportant exceptions, collapsed, numerical superiority notwithstanding. The Turkish consumption of cartridges was in proportion. On the 11th and 12th September it reached, in Bash, Kanli, Omer, Issa, Kavanlik, Tabiyas, and the Krishin redoubts, 300 per man per day; in Baghlarbashi some of the men had exhausted their complement of 500 cartridges in six hours' fighting. *To carry out this mode of warfare the organization of the cartridge-supply must be as perfect as it was in Plevna camp.* Not only had we an immense central stock, housed in a mosque, which was replenished from Orkanyé at regular intervals, but each redoubt had its own reserve store, each battalion its mobile stock, each trench its numerous boxes

"The heavy casualties sustained by our troops on so many occasions have been caused by the pumping process with the Mauser rifle, not by skilful use of their arms on the part of crack shots."

This is probable, because the decision in battle depends on the fire-effects of the mass, and not on those of only a certain few individuals in it; but there was this essential difference between the Boer practice and ours as stated—they saw their targets plainly advancing over the open ground in front, and rightly pumped lead into them; we did not see any targets at all, and pumped back lead into space! Surely we must find some other solution to the matter than that stated in the following italicized words:— *

"The need of maintaining a stream of bullets, of pumping lead, in the direction where the assailants are observed, or *where they are believed to be*, is no less stringent in the defensive than it is in the attack."

Granted that we have all we desire as regards securing economy in expenditure of ammunition by means of a good individual fire-discipline, well under good control and wise direction, we have yet to inquire, placed in convenient positions for the men to help themselves freely. There was a service of pack-horses, by means of which the stock of any redoubt or battalion could be replenished at the central store at a moment's notice. These arrangements worked without a hitch, even in the confusion of a partly unsuccessful general engagement." As modern attack formations have nothing in common with those used by the Russians in 1877, a similar expenditure of cartridges would not have a like effect. And the question is, How is such a supply, as indicated above, to be assured nowadays on the battle-field?

* *The Tactics of To-day*, p. 80.

How are we to provide the skirmishing-line with sufficient ammunition to enable them to maintain a fire-fight of some hours' duration? * In the first place, the ammunition can only be carried either on the men and pack-animals, or on carts, or both. But in what proportions? For the sake of mobility we want to lighten the soldier as much as possible, and yet he must carry some ammunition in case of the unexpected happening, as it always does in war. Besides this, he must have ready some means of carrying an adequate additional supply when going into action. Pack-animals and carts cannot be taken under an effective fire, and human carriers cannot be nowadays expected to go backwards and forwards, over a fire-swept ground, with supplies of ammunition for the skirmishing-line. Consequently one or more of the following three methods must be adopted:—

(1) To give the soldier, before the fight begins, all the ammunition he is likely to require, say 300 rounds. This would be a somewhat heavy burden for him to carry at first on his person, but it will gradually lighten as the ammunition becomes expended.

(2) To make all reinforcements bring up into the skirmishing-line extra supplies of ammunition, which should then be distributed.

(3) To actually relieve the exhausted skirmishing-line with fresh troops who are fully supplied with ammunition.

* See pp. 8 and 152.

Each of these methods has its advantages and disadvantages. Thus it may be doubtful, in some cases, whether, under a severe fire, the second or third methods could be fully relied on, except in the dusk or after nightfall, or when the features of the ground are favourable. The more ammunition a man is made to carry, the less equipment and clothing he can take on his person, and the more has to be carried for him, thus increasing the battalion baggage-train to the detriment of the mobility and compactness of the battalion on the line of march. Hence the choice is one of two evils. But there can be no doubt but that every man should go into action with all the ammunition that he can conveniently carry, the contents of the ammunition-carts—battalion, brigade, and divisional—being opportunely issued for this purpose. If every soldier carries 100 rounds on his person, and has another 100 rounds carried for him in the battalion ammunition-carts, then the companies told off for work in the skirmishing-line can be supplied with from 250 to 300 rounds per man to start with; the companies kept in reserve being supplied, if necessary, from the leading line of ammunition reserves or columns. Of course, the ammunition of the killed and wounded should always be collected and distributed to the nearest men.*

The great difficulty, however, is to determine how this quantity of ammunition can be conveniently carried on each man. Besides bags, both bandoliers and

* See *Infantry Training*, 1902, p. 233.

waistcoats, covered with suitable pockets in front, have been proposed. But whatever method is eventually adopted, it must not interfere with the men moving forward either at speed, or by creeping and crawling on the ground, nor with their ease in lying down and firing from behind cover. And, further, the ammunition must be easily got at at all times, or else it will be taken out in handfuls and laid on the ground, which will result in much of it being left behind when the order to advance is given. Pocketed waistcoats do not appear to be suitable for the soldier, and hanging bags are not suited either to speedy movements or to creeping and crawling. The bandolier offers many advantages in these respects, but, on the other hand, any pressure across the chest detracts very considerably from the marching powers of the men. The best method seems to be to carry 100 rounds both on the waistbelt and in a small bag, and to pack all the rifle ammunition carried in the battalion and divisional ammunition-carts in bandoliers carrying 50 rounds or more each, so that one or two bandoliers can be rapidly served out to each man as required. These bandoliers could be made of any strong coarse material, and it would not matter how dirty they got in peace exercises, as they would never be used on parade. The ammunition in the waistbelt and bag should then be used up first. The supply of ammunition to a firing-line should be frequently and carefully practised in peace time.*

* See para. 163, *Musketry Regulations*, 1903.

A Boer prisoner, taken during the second or guerilla stage of the South African War, is reputed to have stated that his "commando" managed to obtain considerable supplies of ammunition from the cartridges that our men let fall on the line of march or left behind on their camping-grounds. These cartridges were thrown out of their receptacles during the act of trotting the horses, or fell out while the men lay on the ground. Consequently the design of the cartridge receptacles is of considerable importance, and should receive careful consideration. These receptacles should not only be able to hold enough, but should also be able to carry their contents conveniently and without fear of loss.

Owing to the possible disastrous consequences that may result from a premature expenditure of the ammunition carried by the men, an excellent suggestion has been made,* that a portion—say 30 rounds—of the ammunition carried by every man should be treated as "emergency ammunition," which, like the "emergency ration," should not ever be used without the express order of the senior leader present locally. If such "emergency ammunition" was laid down by regulation, and was carried in a special pocket or receptacle, it would ensure as far as possible that the men would not under any circumstances be entirely without ammunition except for very good cause. In European fighting, where extensive use of cavalry for shock purposes is

* By Major J. E. Seely, D.S.O., M.P.

practised, the adoption of the principle of "emergency ammunition" might often be the salvation of infantry.

NOTE.—The regulations for the supply and transport of S.A. (.303-inch) ammunition in the field are laid down in *Infantry Training*, 1902, section 258. Para. 3 of this section has been amended by Army Order 32 of February, 1903, dealing with the new war establishment of the artillery accompanying an army in the field, and which practically converts the mass of this artillery into "divisional artillery," two brigades of Royal Field Artillery being given to each infantry division, with heavy gun, howitzer and horse artillery brigades forming the "corps artillery." This Army Order lays down that "an ammunition column will form an integral part of each brigade of artillery. Infantry divisional ammunition columns and corps troops ammunition columns, as hitherto organized, will consequently disappear." Army Order 32 of 1903 uses the term "brigade-division" for an organized group of two or three artillery batteries, but, by Army Order 97 of June, 1903, the word "brigade" is now to be used in place of "brigade-division."

The British Regulations lay down that the following rounds are to be carried :—

By the soldier ...	...	100 rounds per rifle.
On machine guns ...	...	4000 rounds packed on carriage.
In regimental reserves ...	{	4 boxes, or 4400 rounds, packed on 2 pack-animals.
		64 boxes, or 70,400 rounds, packed in 4 S.A.A. carts.
In artillery brigade am- munition columns	{	77 rounds per rifle, and 8800 rounds per machine gun.
In ammunition park ...	...	55 rounds per rifle, and 9000 rounds per machine gun.

Taking a battalion as 800 rifles, this gives 100 rounds carried by the soldier, 93 rounds carried in the regimental reserves, and 77 rounds carried in the artillery brigade ammunition columns, or 270 rounds per rifle on the battle-field, with 55 rounds per rifle in the ammunition park. Officers commanding battalions are responsible for the ammunition in regimental charge; the remainder is in artillery charge.

In India, Army Order 743 of 4th October, 1902, lays down the following scale to be carried for infantry :—

By the soldier	100 rounds.
In regimental reserves	80 rounds per rifle.
In infantry ammunition column	120 rounds per rifle.

This gives 300 rounds per rifle on the battle-field. In addition, 200 rounds per rifle are to be carried in the ordnance field park.

One section of an infantry ammunition column carries 82 boxes of 1100 rounds each for British infantry (providing 120 rounds per rifle for 749 rifles, with a total weight of 82 maunds), and 77 boxes for native infantry (providing 120 rounds per rifle for 705 rifles, with a total weight of 78 maunds). These can be carried (including a tent and men's baggage) for each section by 18 camels, or 48 pack-mules, or 9 mule or bullock carts.

CHAPTER XI

FIRE DISCIPLINE, CONTROL, AND DIRECTION

It is well to bear in mind that though *a preparatory attack by fire* should be made along the whole front of the enemy, yet *the decisive assault by shock* should only be made on a portion of that front.* Consequently the general engaging attack should never be carried so far as to so compromise any part of the firing-line as to prevent its retreat with comparative ease if ordered; but yet it should be carried far enough to pour an effective fire on the enemy, and to hold him and his reserves down to their positions, until it is too late for them to make the necessary movements and dispositions to meet the decisive assault when it takes place. The time and place for the localized assault will be chosen by the commander of the whole force, who will by degrees assemble the assaulting troops behind that portion of the firing-line in front of the part of the enemy's position that is to be assaulted. When all is ready, every endeavour should be made

* See *Infantry Training*, 1902, sections 137 (2), 158, 217, 220, and 221; and *Combined Training*, 1902, sections 8, 18, and 19.

to create an "event," or decisive moral crisis, in the enemy's ranks in that locality by directing the most violent torrent of artillery and infantry fire possible on the enemy's front to be assaulted. This should not last too long, or the enemy will have time to bring up his reserves to resist the assault, and under the nervous, paralyzing effect of the decisive moral crisis thus produced on the enemy, the assaulting body moves forward to its task. If any failure occurs in forming the decisive moral crisis, or in judging when it has been effected, the assault will most probably be driven back with great loss.

As regards the problem of demoralizing the enemy by fire effects, moral or physical, so as to render his shooting so innocuous as to enable us to advance without undue losses to the bayonet assault, we must always bear in mind that the demoralizing and disorganizing process is not one-sided only. The *moral* and the nervous energy of both sides is being gradually expended during the progress of a hotly contested fire-fight, and the ultimate deciding factor is, who will have the greater determination to see the matter through when the crisis of the fight comes. And here it is that the moral factors—such as discipline, sense of duty, patriotism, *esprit de corps*, religious fervour, doggedness, desire to revenge past injuries, national prejudices, and similar motive causes to enduring and persistent action—tell with such powerful force in the fierce wager of battle. It is the existence or non-existence of these

same motive causes to action in regiments and battalions that make them differ so much in their fighting value. And one of the greatest services to his country that every officer can perform is to educate himself and his men to preserve their coolness and judgment in moments of great danger and mental and moral stress, and to bear all fatigues and privations and discomforts with cheerfulness and patience. Cheeriness and will-power are two great manly virtues, and there is great truth in the old English proverb, "It is dogged that does it." We cannot lay too great stress on the influence of the moral factors in war, and on maintaining them in full vigour during the war, because victory is usually far more due to them than to the influence of any other factors.

There is one advantage that we possess over other nations, and that is our small companies of from 100 to 120 men. The large companies of other nations (of from 200 to 250 men) were, and still are, the product of financial economy. With their huge armies, recruited by conscriptions, they were unable to afford the expense involved in providing officers for double the number of small companies. Foreigners envy our small companies, because of the increased facilities they afford for the greater individual training of the men, and for the greater power of control that their officers have over them. Our Imperial conditions compel us to occupy many places with small units, and this obligation is also facilitated by our small company organization.

And there can be no doubt that many of the disadvantages that our Army has to labour under are greatly minimized by the great influence of our company officers over their handy and easily managed commands, and by the power they thus possess for ensuring a good training of, and control over, their men. And this advantage is one that is of increasing value as fire-arms improve in deadliness of fire.

We can now proceed to consider *the use of the rifle in battle*, namely, the "direction" of,* the "control" of, and the "discipline" for, infantry fire. The duty of *directing* the fire falls upon the company leaders and officers senior to them; the duty of *controlling* the fire falls on the junior officers and senior non-commissioned officers; while the *discipline* required in order to enable this direction and control to be carried out falls on the rank and file.

Fire-discipline applies to the rank and file, and it is really the same as every other kind of discipline. It means both ready obedience to orders and, in the absence of orders, ready obedience to the instructions that have been imparted in peace time.† Thus a good and effective fire discipline is really more a state of mind than mere mechanical obedience, though it is a state produced by constant habits formed by the constant practice

* *The Musketry Regulations for the Native Army in India (Provisional)*, 1901, call "fire direction" by the term "fire tactics," but the term "direction" is the expression made use of in *Infantry Training*, 1902, sections 127 (1) and 127 (3).

† See *Infantry Training*, 1902, section 214.

of correctly performed acts. Ingrained customary habits will in time become a second nature that will impel men to unconscious or automatic action even in times of great moral and mental strain. A good fire-discipline is obtained when the men will not open fire until ordered; when, after opening fire, they will listen for, and readily obey, any fresh orders that may be issued; when they will fire at all times coolly and steadily, with sights adjusted to the range, and carefully aim at selected targets; when they carefully consider at all times the great value of every round fired, and thus husband their ammunition for the shorter ranges; and when they at all times carefully observe the effects of their fire in order to make any necessary corrections in elevation and direction that may be needed to make it more effective. All these appear to be very simple and self-evident requirements, but, as a matter of fact, it is a most difficult task to so ingrain them into the soldier that he will act on them as a matter of course on occasions of great moral and mental strain.*

Fire-control consists in imparting to the men the orders issued by the company and higher commanders, in seeing that these orders are obeyed, and in assisting the men who are firing, with advice and observation, to carry out their duty more effectually.†

Fire-direction consists in determining, in accordance

* See footnote, p. 48.

† See *Infantry Training*, 1902, sections 127 and 128; also section 213.(4).

with the governing tactical idea of the battle, (1) the moment for opening the fire; (2) the proper tactical extension of the men or density of firing-line; (3) the advance to shorter ranges; (4) the selection of the objects to be fired on and their allotment to different portions of the firing-line; (5) the backsight elevations to be used; (6) the observation of the results of the fire; (7) the kind of fire to be used; (8) the amount of ammunition to be expended at each halt; (9) the rapidity of the fire; (10) the strengthening of the firing-line, when and where necessary; (11) the replenishing of the expended ammunition, when and where possible; and (12) the psychological moment for advancing to the bayonet assault.

These several factors of the art of fire direction are closely inter-related, and cannot be fully separated from one another. However, we have to separate them mentally by analysis, but in practice they require to be combined synthetically before orders are issued. In fact, every military order is the outcome of a synthesis of many and varied considerations.

We may here recall what has already been stated about the danger of men acting on bugle-calls, about the necessity of all ranks maintaining their coolness and judgment, and about the necessity for making an ample use of all the means available for communicating acquired information to others who are in need of it. With this proviso we will briefly consider in turn each of the above factors that go to make up what is known

as "fire-direction," and see how important in battle are the four connected subjects of fire-effect, invisibility, invulnerability or cover, and movement. But before doing so, it is well to bear in mind the great difficulty that is practically experienced in the passing of orders along a firing-line, and from rear to front, or *vice versa*. Even with practice, and under peace conditions, the passing of orders is apt to be slow, while the orders themselves are often mutilated or altered in transit, especially lengthy orders, such as must be given when firing at moving targets. Yet the passing of orders is a most essential subject, and should be carefully practised in all field manœuvres and field firing.*

(1) The question as to when to open fire involves that of the distance at which infantry fire should be opened in a battle that is begun in clear daylight. As regards this subject, the experience of the Boer War is very clear, viz. that though the enemy should not be closely approached within the decisive ranges until he has been so demoralized that his fire is rendered practically harmless, yet every effort should be made to reserve the opening of the fire until the longer of the shorter ranges are reached, or nearly so.†

The arguments against the general use of long-range firing have already been given. *In no case in any war has long-range firing produced any decisive*

* See *Infantry Training*, 1902, sections 127 (1), 127 (7), 156, and 160; and *Combined Training*, 1902, sections 10 (6), 10 (7), and 23 (7).

† See p. 171.

tactical results in battle, unless the beaten side has deliberately offered the enemy suitable objectives as regards size and density, as we did at Colenso, and as the Russians did at Plevna and the Germans at St. Privat; that is, long-range firing has on some very few occasions produced certain local and temporary advantages in special cases when the enemy has been foolish enough to expose himself in masses, and the backsight elevation for the range has been happily hit on. Victory is decided at the short decisive ranges, but it is prepared for at the medium ranges. Hence the former are the important ones to consider.* Long-range firing, to be effective, requires a correct estimation of the backsight elevations, a large consumption of ammunition, a relatively prolonged concentration of fire on selected objectives, and power of observing the results. But if there is ample ammunition available that can be easily replenished, if the proper backsight elevation for the range is ascertainable by observation of the effects of the bullets on the ground or the enemy, if the slopes of the beaten ground are not too unfavourable, if the object to be fired at is of suitable dimensions, especially as regards height and depth, and is of sufficient tactical importance at the moment to be fired at, and if the fire is executed by a sufficiently large number of troops specially detailed for the purpose, then the long-ranging power of the modern rifle may be

* See *Infantry Training*, 1902, sections 213 (1), 236 (5), and 236 (7), all of which are most important.

judiciously and cautiously made use of. But it should be stopped if, after some minutes, no results are observed from its use, and it should never be permitted without the consent of the senior officer present.

It should be always borne in mind that when the sight for the range is ascertained by any fire unit, the information must be at once passed on to the adjacent units.*

When long-range fire is employed, as many men as possible should take part in it, in order to arrive as rapidly as possible at the desired result, and because the moral effect of any fire is directly proportional to the rapidity with which it inflicts losses.

It may be noted that the real reply to the increased ranging power of the rifle is to increase both the power of the guns of the artillery, and also the proportion of guns to infantry.

Of course, when time and opportunity admit, the *ranges* of all prominent points within rifle range should be ascertained by measurement or survey. The need for every officer and non-commissioned officer possessing a pair of powerful *field-glasses* or a *telescope*, as an essential part of his fighting kit, in order to assist the eye in seeing what to fire at and what the effect of any fire is, and the need for simple and portable short-base *range-finders* working to only a small percentage of error, have already been pointed out. And in deciding what range to open fire at, due consideration must be

* See *Infantry Training*, 1902, section 127 (7).

paid as to what tactical objective can be seen to aim at, and how clearly it can be seen. The effect of the colour and background of the target, and the limitation of the power of vision of most men, have been referred to. However, after all, the distance to be considered as the inferior limit of long-range fire is a matter of more or less arbitrary choice, but perhaps a definition may be found by classifying all fire as "long-range" in which an accurate knowledge of the range forms an essential condition for efficacy.* If this definition be accepted, then the *long ranges* would begin at about 800 yards, while double this, or 1600 yards, might be taken as the inferior limit of the *extreme ranges*, at which only large and visible masses of troops would be fired at by infantry, if they fire at all. It seems hardly necessary to classify the ranges under 800 yards as anything but "*short*." However, if this be objected to, the ranges between 500 and 800 yards may be called "*medium*," and those under 500 yards as "*decisive*;" for, indeed, such they proved to be at Magersfontein and other fights. The Boers on many occasions reserved their rifle-fire until our troops were well within the 800 yards' range, with the result that our advance was not only checked at once by the moral effect of suddenly inflicted losses, but also for a considerable time, during which the checked men could neither go forward nor

* The classification of ranges is now laid down in *Infantry Training*, 1902, section 215. These pages were written long before the publication of *Infantry Training*, 1902, as stated in the preface.

retire, and had often to lie for hours exposed to a burning sun, without food or water, and were unable to move without drawing on themselves a concentrated collective fire that probably meant being hit. In no fight in South Africa does there seem to have been any difficulty on our part, when our troops were properly extended in width and depth, in being able to approach to about 800 yards from the Boer firing-lines without undue losses; but the difficulty was to cross this last 800 yards' zone without crippling losses, and filling the hospitals and ambulances. How this is to be done we shall deal with later on; here we are only dealing with the experienced effects of modern rifles in the hands of undemoralized and trained men, when firing over open ground and in clear daylight. However, it should always be borne in mind that long-range rifle-fire can never replace the decisive fire at short ranges; long-range fire can only play a secondary part, never a decisive one; but this secondary rôle may, in many cases, be of considerable value if used judiciously and under suitable and favourable conditions.

In the attack: a premature opening of fire only tends to lengthen out the fight, while it fatigues the men, diminishes the offensive spirit of inferior troops, and may cause an exhaustion of the ammunition when the closer and more important ranges are reached at which alone battles are decided. The question of fire is strictly connected with that of the supply and replenishment of the expended ammunition. The French

defending the village of St. Privat, which formed the French right at the battle of Gravelotte (August 18, 1870), had to retire before the German assault for want of ammunition, although they had practically annihilated an earlier assault made by troops in more or less massed formations on the same village by an infantry fire begun at about 1200 yards' range, and concluded at about 600 yards. Hence the attack, properly dispersed in width and depth, should try and get as close to the enemy as possible before opening fire—that is, as close as possible without suffering undue losses. But, even in open country, a serious fire should not be opened, in a general manner, by the attack until the medium ranges are reached.

In the defence, the question of when to open fire is far more difficult to decide.* If possible, the fire should be reserved by the concealed and invisible defenders until the decisive ranges are reached by the advancing firing-line of the attackers—when the defenders' rifle-fire should suddenly and unexpectedly break forth on them like an overwhelming storm. But in the future it is certain that the attackers' firing-line will be preceded by scouts or patrols, whose object will be to prevent such a terrible surprise, but who will probably run a great risk themselves. There is no doubt but that nowadays the first duty of the attacking infantry is to find out exactly the positions occupied by the enemy's firing-line, and, if need be, to suffer in doing

* See *Infantry Training*, 1902, sections 162 and 250.

so, in order to inform the artillery of where the tactical objectives lie;* the attacking infantry will then wait for the completion of the artillery preparation, while assisting in it as far as possible, before seriously pushing forward the advance to any material extent. Hence the first duty of the defenders should be to prevent the attackers carrying out this programme. If the attackers' firing-line will not advance, or only does so slowly with great caution and at a considerable distance in rear of its advanced scouts or patrols, then it may be advantageous to open fire at the medium or even long ranges from selected portions of the firing-line in order to induce the enemy to come on. But an early opening of the defenders' fire will cause the assailants to take up a dispersed formation at an early period of the fight, and so tend to minimize the deadly effect of a short-range fire on dense formations. It may be stated that the defence usually possesses the conditions for effective long-range fire, though the qualifying word "effective" means very much less at a long range than it does at a short range. The defenders would, or should, always know the ranges, or rather the sighting for the ranges, of the various prominent objects in front of them, and they have, as a rule, good opportunities for concealing and covering themselves, for seeing the advancing enemy, for observing the effect of their fire on the ground or on the enemy, and for assuring ample supplies of ammunition being available from the outset to the end of the fight.

* See *Combined Training*, 1902, section 18 (3).

In any case, the main firing-line of the defence should not carry on a long-range fire; this should only be done by advanced troops sent out to compel the early deployment of the enemy, if he cannot be induced to approach in more or less dense formations. In this way the troops that have to carry on the main defence are left intact when the enemy approaches, and will have a full supply of ammunition, after the advanced troops have been withdrawn. In such a case the advanced troops need not consider the question of the greater expenditure of ammunition that long-range firing brings about.

In temporizing actions and in false and holding attacks * fire may be opened at relatively long ranges, for then the object is not so much to gain direct tactical results as to contain and deceive the enemy. Also, if there is no artillery, or if the artillery arm is weak, infantry may open fire at longer ranges than usual in order to prepare the way for its own advance, provided that a large supply of ammunition is available, and special troops are detailed for carrying out the long-range preparatory firing (compare p. 204). At these longer ranges it will be possible to keep the troops firing at them supplied with ammunition.

But it must never be forgotten that, as a general rule, far too much is expected of infantry fire. In the first place, *ample time is always required for preparing a good fire-effect*, and we must always remember that,

* See *Infantry Training*, 1902, sections 223 and 224.

at all ranges over the decisive ranges (i.e. over 800 yards, say), efficacy of fire can only be obtained by a relatively long-continued collective fire, concentrated on certain objectives specially selected on account of their offensive or defensive importance at the moment, and then only if the fire is well placed on the target.

(2) The higher and broader and deeper the objective, the more vulnerable it is, the more easily is it seen, and the greater the range at which it will be liable to suffer losses when opposed to the fire of rifles in the hands of undemoralized and trained men. To avoid this, units exposed to such a fire are extended in breadth and depth, and are made to adopt low attitudes or to seek the shelter of cover.* Thus, extensions and attitudes and cover are mainly dodges to avoid losses, and must not be looked upon as tactical means or applying force, except indirectly by preserving the force-applying means from injury. When an effective hostile fire is absent (as in the Zulu War and in the late Nile operations) none of these dodges should be made use of, as they only tend to prolong the duration of the fight and to lessen the control over the men.

However much the men may be trained to seek cover, yet they must be thoroughly imbued with the fact that cover is only a means to an end, and that end is to get near enough to the enemy to make him afraid

* See *Infantry Training*, 1902, sections 137 (6), 139, 152 (4, i.), 157, 158 (2, ii.), and 216 (2), on extension, and sections 184 and 215 on dispersion in depth. The evils of crowding under fire are referred to in sections 154 (5) and 219.

by fire, and then to rush him with the bayonet if he waits any longer. Hence the men must fully realize that cover is a thing to be left as soon as a favourable opportunity occurs, and that the one thing they have to do is to approach the enemy, in order to ply him with a more effective fire, and then, after making him "nervous" by the judicious application of artillery and infantry fire, and by the sight of his being steadily approached in spite of his efforts to stop it, to charge him with the bayonet.

The extensions to be adopted, and the moment for adopting them, depend partly on the possible effects of the hostile artillery shrapnel fire and partly on the possible effects of the hostile infantry fire. The shrapnel fire of artillery is nothing more than the use, by artillery, of a concentrated collective fire of bullets at a far greater range than can be made use of by infantry. Such shrapnel fire can be made use of with effect up to 5000 or 6000 yards with field guns, and up to still longer ranges with heavy guns; and at the longer ranges, when guns have got the range, rifles cannot hope to compete with them, especially if the guns are in any way concealed and their positions are unknown. But it is very rare for artillery to be able to find such long open ranges as stated above, except in countries like South Africa, and even then there was frequently ample cover afforded by the ground for the nearer approach of the infantry units in close order. But as soon as artillery can fire effectively on infantry, the

latter must be beforehand in taking up adequately extended and dispersed formations, making use of thin, well-extended lines following each other at considerable intervals apart—not less than 300 or 400 yards—so that the fire directed at one line will not be *equally* dangerous to the next one in rear. In South Africa, under the effective fire* of the Boers, we began by adopting extensions with the men at 4 and 5 paces apart. These distances were subsequently successively increased to 6, 8, and 10 paces by order of Earl Roberts, and in some later cases they were as much as 30 paces apart, though probably this was done more to occupy a wide front than for any other reason.* These extensions, moreover, were adopted in the face of a hostile artillery that practically fired only weak common shell, because their shrapnel with time fuzes were, as a rule, very defective. °

The great advantage of extended formations, when exposed to a deadly fire, is the partial invisibility they confer on the troops, the greater ease of movement they permit, the greater facilities for making use of cover they afford, and the reduction of losses they effect.† They are

* See *Infantry Training*, 1902, section 215, on the width of ground struck by a shrapnel, and on the radius of explosion of a high explosive shell. But such projectiles would hardly be aimed at single men. The subject of extensions under fire is dealt with in *Infantry Training* in sections 152 (4), 157, 158 (2, ii.), 161, 163, and 216 (2). The disadvantages and dangers of over-extension are more than once noticed, and should be ever borne in mind.

† The effect of losses is manifold. They reduce our force-applying means, fill the hospitals and ambulances, lessen the mobility of the army, and throw more work on the survivors.

equally useful in these respects against hostile infantry fire as against hostile artillery fire, and so long as this hostile infantry fire is effective, the men should be at such intervals apart as will prevent a concentrated collective rifle-fire directed at any man being able to reach either of the adjacent men at the same time.

But widely extended formations are neither able nor fitted to produce decisive tactical results, owing to their relatively weak fire and shock-power. The first condition for victory is to gain a superiority of fire, and this means a judicious combination of quantity and quality of fire—that is, of the number of men firing, and their ability to use their rifles effectively. Both of these should be as great as possible. As the enemy is approached, and as his fire and the cover afforded by the ground permits, the density of the firing-lines must be gradually increased by the arrival of reinforcements sent into it either gradually or in bulk. There is no particular advantage in a greater density than one *undemoralized man* per pace in the firing-line.* It should be the endeavour of the leader of the attack to form such a dense firing-line under cover at the outer limit of the decisive ranges, or even nearer to the enemy if possible, and from there to bring about the decisive

* The demoralized men in a firing-line do not count for obtaining an effective fire, and as they have only a bad influence on the others, and increase the chance of losses, it is better for them to be left behind when possible, until they have somewhat recovered their nerves and wits again, and had their ammunition replenished, when they can be led forward again as reinforcements.

moral crisis that alone can effectively prepare the way for the final bayonet advance on the front of assault, if the enemy still persists in offering resistance. We must always remember that the moral effect of a given loss increases as this loss is more quickly and suddenly inflicted.

In connection with this matter, it may be pointed out that whenever a really concentrated shrapnel fire of a large number of guns can get a fair chance against troops, its efficacy can only be characterized as destructive. Troops that are not covered from its bullets cannot exist under it, provided the fire is well placed and well concentrated. But there are a certain number of conditions that must be necessarily fulfilled in order that shrapnel fire may have the "fair chance" referred to above. In the first place, the guns must be free to fire on the opposing infantry; in the next place, the troops fired at must not be so protected by cover as to prevent the shrapnel bullets injuring them when they attempt to use their rifles; in the third place, the position of the objective to be fired at must be known fairly accurately; and lastly, the fire must be a concentrated one from several guns. This last condition is in full accordance with what has been already said about the necessity for a concentrated collective fire at long ranges. The Boers rarely, if ever, concentrated their artillery fire; they readily deserted their guns when fired on, and their shrapnel shells were of such an inferior character that they rarely burst. The

consequence of this was that our troops suffered but little from the Boer artillery fire. As regards our own shrapnel fire, it always had a most marked effect when all the necessary conditions were present. When any one of them was absent, our shrapnel fire was nearly as ineffective as that of the Boers. It is a point of special importance that cavalry and infantry officers should have as practical acquaintance as possible with the effects that can be produced by artillery fire, by being made to visit from time to time the various artillery camps of exercise.* A text-book information on the use of the artillery arm and its projectiles is not sufficient nowadays for cavalry and infantry officers.

The following description is given by Lieut.-Colonel Callwell † of the advance of a modern attack, though it is somewhat difficult to make it agree with the descriptions of actual fighting that have been given by other writers, most of whom profess to have been eye-witnesses of what they have written. After having stated that the term "firing-line" is now hardly applicable, Lieut.-Colonel Callwell proceeds to say—

"It was observed above that the term 'firing-line' was no longer applicable to infantry fighting in the present day—a remark which, however, only refers to infantry in attack. Nowadays, although the front line will do most of the firing, others in rear will also bear their share of it. It is obvious that if infantry be advancing across a level

* See *Combined Training*, 1902, section 1 (3).

† *The Tactics of To-day*, pp. 64, 65.

plain, or up or down a glacis slope, only the front line will be able generally to fire. But level plains and glacis slopes are uncommon; ground is usually undulating and broken. On ordinary terrain each of the advancing lines will from time to time be better placed at the moment for firing on the enemy than any other, and it will take advantage of this. Line after line, as it tops a rise or before it descends into a hollow, will lie down and discharge a few rounds ere continuing its movement to the front. It will, indeed, sometimes be the case that several successive lines will be firing simultaneously. It is clear that they can safely fire over each other's heads when advancing down the forward slope of any well-marked undulation, or if they be traversing a plain when the enemy in front of them is perched on some commanding eminence. When this is the case, a company with its four successive lines can bring a hail of bullets to bear on the objective. Then, again, a small knoll or hillock situated so as to afford a good field of fire and of view, and having a surface which provides satisfactory natural cover to the foot soldier, will sometimes be occupied by a section (20 to 25 men) for the express purpose of maintaining a steady continuous fire upon the foe in front, while the remaining sections of the company continue on their way. Clearly, there is no special firing-line in the attack formation of the present day."

In the absence of any corroborative evidence from other writers, it is not easy to accept the above description as representing the normal character of the fire-fight of a present-day attack against a civilized foe armed with modern weapons and trained in their use. It presupposes the visibility of the enemy, also great coolness and judgment and care on the part of the

advancing troops, and the power of controlling with ease the movements of the various successive lines of the attack, as well as the acceptance of long-range firing as a desirable normal practice in battle—all of which presuppositions are of such an exceedingly doubtful character that they cannot ever be relied on for use in more than a very few exceptional cases. Consequently it is still advisable to retain the term “firing-line” for the leading line of skirmishers forming the front of the attack.

(3) The attacking firing-line has to advance, but in doing so it will always halt to fire. At first the halts for firing will be of relatively short duration, the advance being made at a marching pace only. But after a while, as losses begin to be seriously felt, the halts will have to be prolonged, and the further advance made by gaining ground to the front by a series of successive alternate rushes at speed and pauses for resting and firing.* The rushes at speed are to avoid losses by lessening the time of exposure, and the pauses are to enable the breath to be regained and the firing to be effectively continued. The rushes should, if possible, be made from cover to cover where such exist, provided the next cover in front is not too far ahead; but where no cover exists, then the men, at the end of each rush, must lie prone on the ground. The rushes should not last so long as to allow of the enemy taking a good

* See *Infantry Training*, 1902, sections 158 (2, v.), 158 (2, vi.), and 158 (3). See also sections 187 (6) and 220 (6).

steady aim at the advancing men; but the pauses should be long enough to allow of the men properly regaining their breath before firing, or else their fire will not have any chance to be effective. Advantage will be taken of these pauses to pass any new orders.

So long as the upright attitude is used, the advance by rushes should be made either by a few widely dispersed men at a time, or by the whole of the men moving together on a relatively wide front; if either of these methods is not employed, then the advance of the men rushing forward cannot be covered by the fire of those left temporarily behind.* But when men are lying prone, those in rear can shoot over them with comparative safety; and therefore, when men have to advance by crawling and creeping, they can do so in any convenient numbers, as they will not then interfere with the fire of those behind them.

When advancing by echelons on relatively wide fronts, the actual moment for ceasing fire in order to advance, and the length of the advance for each portion of the firing-line, will largely depend on the existing efficacy of the enemy's fire and on the progress of the advance of the adjacent units. Units and men must "play together," or act in combination, if the best results are to be obtained.† There is no real good gained by the indiscriminate pushing forward of different parts of the firing-line. It is far better to

* See *Infantry Training*, 1902, section 220 (4), and also pp. 268, 270.

† See *Infantry Training*, 1902, sections 220 (3) and 243.

maintain, for as long as possible, a methodical and orderly advance. If this is not done, there is the great danger of all control over the firing-line being lost, and the battle developing into a "soldiers' battle," which is rather a common, though very undesirable, form of battle with us. But, though the advance along the whole front should be as methodical and orderly as possible, this does not prevent particular parts of the firing-line taking special steps to seize particular points of tactical vantage from which they can better assist the further advance of the neighbouring parts of the firing-line. But, as a rule, the salient or advanced portions of the firing-line (in both attack and defence) specially attract the enemy's attention and fire, and therefore they should be avoided unless circumstances compel, by keeping the troops as much in a general line as possible, though such a line must not be mechanically kept at the expense of the utilization of good ground and cover that may lie ahead; that is, suitable ground and cover must be made use of in preference to the mere mechanical alignment of the firing-line.

The attitudes of the men are of importance. So long as the enemy's fire permits of it, the upright position should be used for movement, and the kneeling, sitting, and lying-down positions for firing, except when the final charge home is being made, when the upright position must be used for both movement and firing. It is useless lying down to fire if by so doing the target cannot be seen. The men in the firing-line

must always take up such positions, when they halt to fire, as will enable them to see their objectives. When the hostile fire becomes too costly for even rapid advances in an upright attitude, the further advances can only be made by creeping and crawling, with the men in rear firing over the heads of the men thus moving forward. All advances can be made either by the men in line, or by their moving forward in succession after one another, called "trickling."* Experience will always show which is the best method to adopt at any given place and time. But the whole question of attitudes, pace, and methods of advances has as much to do with reducing the efficacy of the enemy's fire as with maintaining the efficacy of our own; they are mainly only dodges to reduce the unavoidable losses as much as possible, so that as many undemoralized men as possible may be available for the final decisive crisis, and the hospitals and ambulances kept as empty as possible.

The advance should be pushed towards the enemy by every means possible, until no further advance can be made without suffering crippling losses, which, if suffered, renders the force incapable of further action, and thus has taken from it the very purpose of its existence. During the prolonged halt that now ensues, marking the temporary cessation of the attack, a defensive

* See pp. 211-213, for the necessity of making use of a systematic grouping of the firing-line during the advance for as long as these groupings exist.

attitude is observed, and the way for the coming final advance is prepared, in co-operation with the artillery, by a heavy fire, for the delivery of which the ammunition should have hitherto been most carefully husbanded.

On reaching the outer margin of the decisive ranges, efficacy of fire must take precedence of considerations of safety, and from that range onwards the firing-line must, if possible, be kept reinforced to a strength of at least one undemoralized man per yard, so as to pour on to the enemy the most effective fire possible, both as regards quantity and quality.

It may be observed that one of the greatest difficulties to be overcome in battle is to secure the right direction of the advance of the various parts of the firing-line. The tendency of men under an effective fire is to drift to the right or the left in order to avoid it, instead of moving to their direct front towards a distant named point of direction. The best way to overcome this is to take up successive intermediate points to march on, lying on the line of advance between the men and their ultimate distant objective. This should be done for every company front in the firing-line.

It is quite true that the methodical and orderly process of advances here sketched out was hardly, if ever, fully realized in South Africa; but there were several reasons for this. In the first place, our attacks were, in very many cases, very inadequately prepared

for by artillery fire, and our infantry were often marched in dense formations right into the medium and even the decisive ranges without any previous reconnaissance of the enemy's position or adequate fire preparation; and the Boers also were but too ready to retire when their flanks were threatened. We have tried to show what should be done in the future when opposed to an undemoralized enemy armed with modern rifles and trained in their use, and who is prepared to stand his ground and to counter-attack if need be. Against other kinds of foes simpler methods can be rightly and safely used.

In case the assault is repulsed, the portions of the firing-line to the right and left of it will have the responsible duty of warding off the counter-advances of the enemy until the retiring troops are safe.

The attackers will have to be careful lest the defenders have made use of a "false position"—that is, one lying in front of the real position to be held, and to which latter position the defenders will have retreated when the false position is about to be carried. Any rash advance beyond the captured false position will probably entail heavy punishment. The Boers made a considerable use of such false positions.

(4) As regards the choice of objectives,* it is very necessary to remember that *at the long and medium ranges the collective fire of certain wide portions of the firing-line should be concentrated by being directed at*

* See *Infantry Training*, 1902, section 213 (2).

certain stated targets, and that each man should not be allowed to fire at a different target. Our great object should be to rapidly overwhelm the objectives fired at, because the determination of the enemy to resist is best overcome by the rapidity with which losses are inflicted on him. The longer the range the greater the necessity for a concentrated collective fire, and the greater should be the number of rifles directed on the same targets. (See Earl Roberts' Memorandum, given on p. 121).*

The choice of objectives must be mainly guided by the general tactical idea governing the battle, modified temporarily at times by the special tactical situations of the different parts of the firing-line.

The modern difficulty is not so much in the selection of the objects to be fired on when they can be seen as in being able to see them, and to apportion the different objects selected to the different parts of the firing-line. As a rule, tactical objectives have to be designated by one or other of the marks or objects lying on the geographical position that the enemy is supposed to occupy, and behind which he is supposed to be hidden.† But the general rule for the choice of objectives at any given moment is to choose such portions of the enemy's troops as are considered to be most dangerous tactically for the time being, *i.e.* which

* See *Infantry Training*, 1902, sections 155 (4, iii.), 213 (1), and 213 (4), and *Musketry Regulations*, 1903, para. 274.

† See *Infantry Training*, 1902, sections 152 (4, ii.), 155 (2), and 155 (4, i.), about not firing unless a favourable target is seen.

for the time being are considered to constitute the chief danger to be guarded against. These may be at different times certain portions of his infantry, of his artillery, or of his cavalry. As a rule, the most advanced portions of the enemy are the most dangerous, as they draw the other portions after them.* Hence they should be crushed as quickly as possible. But, on the other hand, the destruction of the supporting troops has often made the firing-line in front of them come to a standstill, and even recoil.† A too frequent change of objectives scatters the fire, and hence the objectives should be carefully chosen according to their immediate tactical importance, and fired on until their action is at least paralyzed for some time to come, if they cannot be altogether destroyed. For preference we should choose objectives directly in front of the men before selecting others to their right or left, unless the primary object at the moment is to assist the advance of neighbouring troops or arms, a contingency which should always be fully considered.‡ If any portion of the firing-line advances, the neighbouring portions should direct their fire outwards if there is

* The late Russian General Skobeloff strongly insisted on this fact in his instructions to his troops in his Akhal Tekke Expedition.

† This was well illustrated in the third battle of Plevna, when General Skobeloff repelled the fourth counter-attack made on him by the Turks, after he had captured the redoubts, by firing, not on the Turkish firing-line, but on the reserves in rear. These he made to retire, and they drew the firing-line back after them.

‡ On the other hand, see what was said on p. 111 about the Boer practice for securing flanking fire.

any danger to their advancing comrades by their continuing to fire straight to the front. If the leading line of the enemy in front is checked, or offers a bad target, then suitable objectives may, for a while, be chosen to the right or to the left, or in rear of his leading line. In cases of any uncertainty of choice between two or more objectives, choose those that can be most easily hit. In choosing objectives we must always fully consider the questions of range (involving effect of fire, error of estimation of range, and difficulty of observing the fire), atmospheric conditions, inclination of line of sight, and slopes of the beaten ground, etc.

"The choice of objectives should be determined, first by their tactical importance, and then by their vulnerability. To avoid changes in the objective, to decide exactly on the object to be hit, and to direct the fire on it well, are some of the greatest difficulties in the direction and conduct of the fire."

The various objectives to be fired on should be apportioned to the different parts of the firing-line during any pauses in the fire, and while the men are recovering their breath before opening fire again.

The Boer War showed again and again *the extraordinary efficacy of a flanking fire* from both artillery and infantry, and consequently *every endeavour should be made by the leaders in the firing-line to make use of*

such a fire, especially to cover the advance of neighbouring troops.*

It may be pointed out that infantry fire directed on guns, which nowadays will generally be concealed behind cover, and will fire indirectly, is likely to have but little effect, if any, at ranges over 1500 or 1600 yards, unless the line of guns can be taken in flank. A gun, posted directly to the front, is but a small object to fire at, and is not easily seen, and it requires an unusual combination of the necessary conditions for long-range rifle-firing to assure any effective results being obtained when firing at artillery. If it is to be done, and if it is not possible to approach nearer to the guns, the best plan is to make use of a number of skilled marksmen provided with telescopic sights, and to specially tell off these men to this duty. It cannot be said that we showed the same capacity as the Boers did in the "direction" of their fire; but, then, the Boers could usually see our troops, while we could but rarely see them.

The positions of any tactical objectives that can be seen from any one part of the firing-line, but which are hidden from those other parts that are directly opposite

* See p. 111. The effect of flanking a long line is to concentrate the objective, and thus to produce a similar effect to a concentrated fire. A flanking fire has a moral effect as well, because all troops dislike having an enemy on their flank or rear, for fear he may cut off their power of retreat. See para. 164, *Musketry Regulations*, 1903, which is a very important one in this connection, and sections 128, 155 (4, ii.), 165, 213 (1), 227, and 236 (2, v.), *Infantry Training*, 1902; and sections 8 (6 and 10 (5), *Combined Training*, 1902.

to them, should be communicated to the latter by signals or any other available means. The provision of means for maintaining communication between the dispersed parts of an engaged force devolves on the higher leaders, but the company commanders are responsible for making an effective use of every available means of communication that offers so as to enable all the other parts of the force, that they can assist with information, to better fulfil their allotted duties. The requirements of the modern battle-field demand that every officer and non-commissioned officer should be able to send and read signalled messages, though not necessarily with the skill of trained signallers. Leaders must never think about their own units only; they should always consider the progress of the whole force of which their units form organic, integral, and constituent parts. It is the victory of the force as a whole that is the object of the fight, and not merely a series of disconnected local encounters in which the local successes are to outnumber the local reverses.

Groups of picked shots, provided, if possible, with telescopic sights, may often be usefully told off to fire on officers—regimental and staff.*

(5) The backsight elevation to be used at each range is of vital importance, because the *efficacy of all fire depends more on the proper backsight elevation for the range being known than on the individual skill in shooting of the men firing.* The worst shot may hit if the

* See *Infantry Training*, 1902, section 155 (4, v.).

proper backsight elevation is used, while the best shot will not hit at all if the backsight elevation has been wrongly estimated to any serious extent. However, the more skilfully a soldier can shoot with his rifle, the more confidence he will have in it, and the greater coolness he will probably possess in action, provided he has previously experienced in field-firing how little skill in shooting counts when the backsight elevations are badly guessed. Hence the value of carefully watching the effects of all firing, in order to make any necessary corrections, or to stop it if it is only being wasted. The backsight elevation to be used depends on the range, on the atmospheric conditions of pressure, temperature, and wind at the moment of firing, on the inclination of the line of sight, and on those conditions of light and shade that affect the amount of foresight made use of.*

In most cases, for stationary or decreasing ranges, it is better to undersight for the supposed range, so as to allow the mass of the fire rather to fall short of the target than over it, in order to gain the benefit of the ricochetting bullets, the efficacy of which is lost when the mass of the bullets pass over the target; but if the ranges are rapidly increasing, it is better to oversight somewhat for the supposed range. The elevations should not be altered for less than 100 yards at a time.

* The question of the backsight elevation to be used involves the subject of range-finding. The German use of "range-finding squads" (p. 72) is well worthy of imitation, because range-finding by eye is undoubtedly a gift, and can be cultivated in those who possess it.

Against charging cavalry within the medium ranges we should use the fixed sight, and aim at the hoofs of the horses.*

It is a standard rule that all aiming in the field should be directed at the ground-line of the objective, in order to lower the fire and to better see the target. (See p. 83.) And for this reason the men are ordered to use the 500 yards' or "fixed" sight at all ranges under 500 yards, because the greatest height of the 500 yards' trajectory is only 4 feet above the line of sight, and so if aim is always taken at the feet of an upright man he will always be hit somewhere, so long as he is within a distance of 500 yards. But the Boer War showed that we rarely get upright targets to fire at at those decisive ranges; in fact, the usual targets are only the heads of the enemy, if, indeed, they show their heads at all. The consequence is that, to have any chance of hitting such a small mark when using the fixed sight, the men would have to aim about 2 feet below the mark at 400 yards, about 4 feet below at 300 and 200 yards, and about 2 feet below at 100 yards. To obviate this we can fix bayonets when we are at 300 yards from the enemy; by doing this we practically reduce the trajectory to that for the 400 yards' range (see p. 55), which only rises about $2\frac{1}{2}$ feet at its greatest height over the line of sight. But in action, especially at close ranges, the men are bound to

* See *Infantry Training*, 1902, sections 107 (5) and 166, on meeting cavalry attack.

be more or less excited and breathless with exertion, and experience shows that under such conditions the men do not aim properly and the fire is always high. (See p. 275.) Against charging cavalry this will be all right, but against men hidden in trenches it will be better to put the sights right down altogether on arriving at the shorter of the decisive ranges. In skirmishes when there is no idea of using the bayonet, and the range is less than 500 yards, the skirmisher should invariably adjust his sight for the supposed range, whenever his objective is under the height of an upright man.

It must be remembered that experience has amply shown that, for physical reasons dependent on the build of the human body, shooting downhill tends to make the fire go high. Attacking troops have again and again experienced fewer losses, from the hostile fire going over their heads, as they approached a defended position on high ground. Hence both for this reason, and for the natural effect of a downward inclination of the line of sight (see p. 255), we must be careful to appropriately lower the sighting when firing downhill.

The question as to whether single or combined sights should be used must be governed by the considerations already pointed out on p. 129, *seq.*

(6) As regards the observation of fire, we must remember that in a well-placed fire, on account of the considerable longitudinal spread of the bullets of a

number of men firing at the same target, *i.e.* of a concentrated collective fire, half the bullets will fall short of the target, and, consequently, the fact that dust is being thrown up by the bullets for even 100 yards in advance of the target is no proof that the fire is too short. If the observer is to the right of the men firing, then the bullets falling short of the target will appear to fall to the left of it, and the bullets falling over the target will appear to fall to the right of it, even if the line of direction of the fire is good. If the observer is stationed to the left of the men firing, the opposite effects will appear to be the case, and the further away the observer is to the flank the greater will the apparent error be. There is nearly always a very great difficulty in being able to see the strike of the bullets, and in some soils it is impossible to do so. However, very little can be hoped for in any case without the aid of powerful field-glasses or telescopes. If the target is on bad ground for observation, experimental firing can be made on any likely patch of ground in its vicinity.

(7) We now come to the kind of fire to be used.* This is a question of very great importance, for it is greatly affected by factors relating to the behaviour of human nature under conditions of great moral and mental stress, and to the means available of handling troops under fire.

* *Infantry Training*, sections 109 to 127, recognizes three kinds of fire, *viz.* independent, magazine, and volleys. Their respective occasions for use are given in sections 127 (8), 136, and 150.

We have always to consider infantry fire under two aspects, viz.—

- (a) Uncontrolled independent fire; and
- (b) Controlled collective fire.

Uncontrolled independent firing takes place when each man does whatever he likes, in regard to the choice of elevation, targets, rapidity of fire, etc., and consequently it is a distributed or scattered fire.

Controlled collective firing is the exact converse of this.

It is almost needless to say that in battle, as opposed to scouting, uncontrolled independent firing means the death of all fire discipline, control, and direction, and so should be absolutely prohibited, as it invariably leads to confusion, disorder, demoralization, impossibility of adjusting sights or passing orders, waste of ammunition, loss of tactical purpose, scattering of fire, loss of control, firing high, and therefore little or no efficacy of fire. Whilst it continues, no tactical movements, except that of disastrous retreat, can take place, and the effect on the enemy is to encourage him to fresh efforts when he realizes the small effects of the wild fire that is being directed at him. An uncontrolled and independent fire, when once started, will gradually become so out of hand, that it will probably not cease until the last round has been expended, and will very probably have been for the most part fired uselessly in the air. The great fault of all shooting in the field, especially at the closer ranges, is that it is usually directed too high, and

this is one reason why aim should always be taken at the ground-line of the objective. The sole preventative for uncontrolled independent firing is a good fire-discipline. Uncontrolled independent firing will come of its own accord when the moral and mental strain of battle becomes too great for the continued maintenance of control and for the influence of habits of fire-discipline. Hence it need never be ordered, but rather every effort should be made to avoid such firing. Consequently, all fire in the field should be controlled.

There are two kinds of controlled collective firing, viz.—

(a) Concentrated—by individual firing* or by volleys—and

(b) Distributed—by individual mass firing.

In both kinds of concentrated firing the target and backsight elevation is named, but in individual firing each man fires his rifle directly he gets his aim, while in volley firing his aim, when obtained, has to be maintained until the order to fire is given, which is always a disturbing factor. The consequence is that deliberate individual firing always gives better results than volley firing as regards both the number and the proportion of hits on the target. On the other hand, volley firing enables a better control to be kept over the men and

* *Individual firing* is far too often spoken of as *independent firing*, even by thinking men, who only do so from habit. But the habit is a bad one, for “independent” firing is a thing to be avoided in every way, for the reasons already given above. Our regulations also, unfortunately, speak of individual firing as independent.

over the expenditure of ammunition, for in a given time more ammunition will be fired away by individual firing than by volley firing, which may partly account for the higher number of hits made by individual firing.

There is, however, another form of volley firing that combines the advantages of both volley and individual firing,* viz. the fire-units get "Ready" and come together to the "Present" by word of command from their leaders, but each man fires as soon as he gets his proper aim on to the object he is firing at. In this system the fire-units must be made small enough for the men to be under control and obedient to orders, for control is absolutely necessary. The advantages claimed for this system are, (1) that the ammunition, being absolutely under the control of the fire-leaders, would be expended to better purpose and there would be no waste; (2) that the men, being accustomed to look continually for orders, would be kept in hand and be easier to handle, and would not degenerate into a disorganized mob; (3) that the results of the fire would be as good as those obtained by independent firing; and (4) that the fire, being under control, could be more certainly concentrated on certain portions of the enemy's line. However, for the sake of simplicity, the usual meaning of the word "volley" will be referred to in the following remarks.

* Advocated by Captain G. W. Gordon-Hall, 1st Yorkshire Light Infantry, in the *Journal of the Royal United Service Institution* for May, 1901.

Individual firing is always more easily applied than volley firing, which requires certain conditions for its effective use. In the first place, volleys cannot be used at all by men who are widely extended, and neither can they be used properly at close ranges under an effective fire by excited men, even when in more or less close order. Further, the maximum unit for effective volley firing is the section.* Of late years there has been a tendency to decry the employment of volleys, but this has been caused by their thoughtless misuse,† and the majority of men will never look behind the surface facts they see to find out whether these facts are the results of either the use or the misuse of the principles involved. Volleys can only be used under such conditions as do not demand widely extended formations, and even then they should only be used when there is any likelihood of the men getting out of hand, and by no unit greater than a section. These conditions obtain in many of our wars against uncivilized foes, *e.g.* the late Nile operations, when close order formations and volley firing formed the correct tactical procedure. The great mistake usually made in volley firing is to employ larger units for it than a section, instead of

* Compare with this sections 107 (7) and 127 (6), *Infantry Training*, 1902. See also section 150 (1).

† Many will doubtless remember cases in which volley firing has been begun by sections, and then, as the ranges decreased, and control would have become more difficult in battle, the volley firing units were increased to half companies, and then to companies, and even to half battalions!

allowing the sections of these larger units to fire in turn successively, like the guns of a battery.

Presuming that the fire is well placed, another distinctive difference between individual and volley firing is that, when individual firing is employed a constant rain of dropping bullets is kept up on or about the objective, and when volley firing is employed the bullets arrive simultaneously in groups at intervals. This distinction has of late been made use of as an argument against the use of volleys. It is stated that the enemy will remain behind cover until a volley is fired, so that no results will be obtained, and then they will rise and fire until the next volley is likely to be fired, when they will again take cover; whereas with individual firing the enemy has no such chance of periodic security. Now, this argument erroneously supposes that the whole firing-line fires volleys together; whereas if the several sections in the firing-line keep up a continual sectional volley firing, the continual arrival of the groups of bullets will prevent the enemy knowing when to expect them or not.

Periodical pauses in the firing of groups and sections is of such very great consequence, for keeping the men in hand and for passing new orders, that it is actually advantageous to create them.*

There are certain other advantages claimed for volleys, such as economy of ammunition, and facility for changing objectives, and for correcting elevations

* See *Infantry Training*, 1902, sections 107 (12) and 152 (2).

in cases of sudden attack (*e.g.* a cavalry charge), etc. But these advantages can be equally claimed for individual firing, if the fire-discipline is good. However, there is no doubt but that individual firing is the best description of fire for use against sudden rushes, for repulsing cavalry charges, and for firing at targets that remain in view but a short time, while volleys should, as a rule, be used only at ranges beyond 800 yards, unless the enemy's fire is very ineffective, when it can be used up to still shorter ranges. Individual firing is controlled by the use of the shrill whistles that should be carried by every officer and non-commissioned officer; when the men hear the whistle they should at once cease firing, and listen for orders. If they will do this at all times, their fire-discipline will probably be very satisfactory.

For the purpose of ascertaining the correct back-sight elevation for a range by observing the strike of the bullets, a concentrated collective fire directed at a particular specified point must be made use of, and experience shows that, so long as the ground struck is suitable for the purpose, it is often immaterial as to whether individual or volley firing is made use of, now that smokeless powder has come into use. However, if no result is obtained with one kind of fire, then the other can be tried.

It has already been pointed out that some of the troops in the rear of a firing-line may at times have occasion to fire over the heads of the friendly troops

in front, in order to assist the progress of the latter by trying to keep down the hindering fire of any hostile infantry or artillery that may be within rifle-range.* In such cases the units in rear that are ordered to fire in this way are certain to be under cover, and so can be safely formed in lineal close order. And therefore in such cases it is advisable to make use of volley firing, on account of the control that it enables to be held over the men, who, if careless in any way, might fire into the friendly troops in front. This happened more than once in South Africa.

Thus it will be seen from what has been said that it is not a case of antagonism between individual firing and volley firing, but of the appropriate use of each kind of firing to the circumstances that are best fitted for them.† They are complementary to each other, and not antagonistic.* And in this connection we cannot do better than to give the following two quotations, taken from the speeches made by two officers with considerable war experience, at the Meerut Rifle Meeting of 1898. Major-General W. Hill, then Assistant Adjutant-General for Musketry in India, stated—

“Recent experiences on service on our North-West Frontier and in the Soudan have emphasized the importance of shooting. After the Tirah Expedition there was

* See *Infantry Training*, 1902, section 237 (3).

† See para. 172, *Musketry Regulations*, 1903; and sections 126, 136, and 150, *Infantry Training*, 1902.

a bit of an outcry that the shooting of the Army had been sacrificed to the senseless fad for collective fire (*i.e.* volleys) and long-range shooting, whereas quick and accurate shooting at medium ranges was all that was needed. Then came the Omdurman battle, where controlled firing (*i.e.* volleys) at long ranges was the only suitable description of fire. The fact is, the soldier must be able to shoot at all ranges, and be able to supply that shooting as the circumstances of the case may require; but in all cases it is essential that he shall be able to shoot straight. Of course, I admit that a good shot does not always 'come off' on service, but I see no reason for supposing that a bad shot would develop into a good shot merely because he was being fired at himself."

Lieut.-General Sir Bindon Blood stated—

"I entirely agree with what has fallen from Colonel Hill regarding the lessons of the late campaign on the frontier in regard to musketry. There is no doubt, as he has pointed out, that individual shooting is the foundation of musketry efficiency, and our late experiences have proved that individual fire, when combined with the power of shooting quickly at a moving object, is the only kind of fire that should generally be used at close quarters on a hillside. But, nevertheless, great and valuable use has been made both of volleys and collective independent [individual] firing, and they must on no account be neglected. On several occasions I was able to use volleys at long and medium ranges, in combination with artillery fire, to cover our infantry advances against the enemy in position.* In this way we captured, almost without loss, the very strong

* The hilly character of the country permitted the safe use of these long-range valleys.

position of Landa Kai in Upper Swat, and the Tangai Pass on the way to Buner; also in the Mahmud Valley several cases occurred in which the same arrangements were successfully used in covering retirements from the hills to the open ground after the destruction of the enemy's towns and fortified villages. As regards collective independent [individual] firing, we found it the only thing in the heavy night attacks we went through. On several occasions the enemy's swordsmen got close to us in the dark, and nothing but a very rapid fire could stop their rushes. Afterwards, I remember that when the rushes began there was independent [individual] firing, with rapid fire of case from the artillery, until all was safe, and then we heard steady volley firing begin. There is another consideration also about the different kinds of fire, namely, that it does not follow because certain natures suit the North-West Frontier fighting, that they are therefore applicable everywhere. Colonel Hill has mentioned the Soudan fighting, in which collective firing [volleys] was almost exclusively used, and probably the same thing would happen if we undertook fighting elsewhere even near India."

General Sir Power Palmer, the Commander-in-Chief in India, at the Meerut Rifle Meeting in 1900, stated—

"It is almost amusing to see how the pendulum has swung backwards and forwards of late years. A few years ago every one was for volleys, and now independent [individual], controlled if possible, unless the men are too much extended, is the order of the day. The evolution of independent [individual] fire is the result, as most things are, of experiment, but it does not follow that one system should altogether exclude the other. If an enemy with inferior weapons gives us a target, as at Omdurman, at a

range when, with our superior arms, we can mow them down, then I would recommend volleys. Volleys also enable us to pick up the range quickly, and sighting volleys will always be useful. But now that we have smokeless powder, and have not to wait for smoke to clear away, it has been found that independent [individual] fire is more efficacious against an enemy, either under cover, or attacking, or moving in extended order. The enemy, instead of bobbing till the volley has passed, and then deliberately returning the fire,* has no time for deliberation, if perpetually buzzed by independent [individual] fire, and intelligent shooting can be better developed."

The Musketry Regulations for the Native Army in India † state—

"The introduction of smokeless powder has removed the great disadvantage which controlled independent [individual] fire formerly laboured under, and it should now be usually used. Peace statistics have proved that the results from it are better than from volleys, and in war, in hilly, rocky country, the only objective usually seen is a few men only exposing their heads from behind cover, or rapidly moving from cover to cover, against whom volleys would be a waste of ammunition. Volleys help the enemy to mark one's own strength and position, and may give him the range under certain conditions. The enemy also, hearing the command and seeing rifles raised for a volley, will take cover as the triggers are pressed, and in his turn will pour in a heavy fire whilst our soldiers are reloading.‡ In volley firing many shots are wasted by

* See remarks on p. 202.

† Provisional issue, 1901, para. 125.

‡ See remarks on p. 202.

men pressing the trigger on the command 'Fire,' whether they have taken aim or not. Volleys also mean a more or less rigid formation being adopted, and advantages of ground and cover may be sacrificed to enable a unit to fire volleys. Moreover, a shower of bullets poured on to an objective without intermission, as would be the case with independent [individual]¹ fire, would be more demoralizing than a succession of volleys,* which give the enemy a slight respite,* in which he can show himself to fire or move about."

Thus we see that the question as to whether individual firing or volley firing should be used entirely depends on the local circumstances of the moment. Volleys require small fire units (sections), in more or less close order, and should be used in cases where a powerful control is required to be kept over the men and their fire, *e.g.* in long-range firing over the heads of friendly troops, in retirements, and against charging masses of savage foes. But they are not suited to a very short-range fire in which the men will be too much occupied with other matters for close attention to orders, and so should be kept for the medium and long ranges; and they cannot be used under conditions that compel the wide lateral extension of the men in order to avoid crippling losses. Consequently, it is in warfare against badly armed and ill-trained uncivilized foes that volley firing will find its most profitable use. Extended formations are only admissible when we have to advance in the face of a deadly fire, and when such a

* See remarks on p. 202.

fire is absent, closed lineal formations should always be employed, because they give the maximum fire-power per yard of frontage, and assure the highest control possible over the men in the face of a greatly numerically stronger enemy, who, however, cannot make use of his superior numbers on the small front opposed to him. And, in the face of such a horde of human devils, section volleys should be used, on account of the control over the troops they give, until the enemy comes well within the short decisive ranges, when rapid individual firing should be resorted to in order to develop the maximum intensity of fire possible. Under such conditions a body of cool and determined men, aiming low with fixed bayonets, could not well miss the living mass of human beings in front of them. If individual firing was resorted to earlier, it might lead to an abnormal expenditure of ammunition and a dangerous effervescence of *moral*.*

* A good illustration of the misuse (luckily without harm) of independent individual firing took place in the fighting at Somali in Somaliland on June 2 and 3, 1901. Four British officers, with 250 native riflemen and 150 spearmen, were left to defend the entrenched post, which was surrounded by three lines of barbed wire entanglements, the nearest 20 yards and the furthest 150 yards from the entrenchments. This, it must be acknowledged, was a tough series of obstacles to get over. The natives were only partially disciplined men, and were attacked by twelve times their numbers, who, however, were badly armed with a variety of odd weapons. The enemy began firing at 1000 yards; the defenders opened an independent fire at 600 yards; the attack came to within 300 yards, retired, came on again to within 300 yards, and retired again for the night. Next morning the main attack with some 6000 men was made, and they not only reached the entanglements, but some 50 spearmen

In civilized warfare, on the other hand, individual firing will be almost exclusively used by the firing-line at all ranges, on account of the wide lateral extension necessitated by modern artillery and rifle fire. But all individual firing should always be most carefully kept under control, so as to economize the expenditure of ammunition, to render possible a rapid change of target and elevation, to ensure the passing of new orders, to stop the firing if by any means it is seen to be giving no adequate results, and to carry out any necessary tactical movements. This control is carried out by the aid of shrill whistles, on hearing the sound of which the men must at once cease firing and listen for further orders.

It must be borne in mind that individual firing requires just as much training and practice as volley firing to obtain good results on the battle-field. And, from what has been said about the value of concentrated collective firing (pp. 116-130), we ought to endeavour to make every possible use of it on all occasions when circumstances are favourable to its employment. This is a very important point to be borne in mind by all leaders in the firing-line.

reached the entrenchments, when a hand-to-hand fight took place. The total loss of the defenders, being only 10 killed and 9 wounded, showed that they had not any serious fire to contend with, and yet their firing was sufficiently wild to allow of the attackers getting up to the very entrenchments, and to lose only 600 killed and wounded. If volleys had been used up to 300 yards, and then individual firing taken up, the firing would, in all probability, have been far more effective.

We have already pointed out that individual firing may be carried out by *groups* or by the *mass*, and that volleys required to be carried out by small groups, such as sections at the most. This brings us to the question of the *organization of the firing-line*, and in this respect it is essential to consider the firing-line as made of a series of sectional or squad or group firing units,* and to make full use of this group organization for as long as possible. While this group organization remains fairly intact, individual firing should be conducted by groups, and, when it disappears, individual mass firing will take its place. But as soon as such mass firing begins it will be practically impossible to concentrate it on definite objectives. The ideal for a firing-line should be that its leaders should always have the power to direct, within a very short time, the whole of the fire of a battalion firing-line on a given objective.† But this could never be done without making use of a group organization in the firing-line. If any weapon could be supposed to be adopted for individual firing, it is the artillery gun, mounted on wheels and firing a projectile whose fall can be seen. But, in spite of this, it is found that, to get the best results, the fire of several guns must be concentrated on the same object. And much

* The *group* is a better unit than the *squad*, because after reinforcing has taken place definite sections and squads tend to disappear, though groups of men can be kept working together for some time afterwards (see p. 217). See *Infantry Training*, 1903, sections 150 (1), 158 (2, ix.), 161, 164, and 171 (3).

† See p. 121.

more is this necessary for the infantry rifle, fired from an unsteady shoulder and projecting a bullet whose fall, in the vast majority of cases, cannot be seen.

The grouping and regrouping of the men in a firing-line under group leaders can be carried out under most circumstances, even after units have become mixed up by the arrival of reinforcements, until the short decisive ranges are reached.

The men in a group should fire at the same objectives and carefully watch each other's fire. They should also keep working together in the advance. So long as the upright attitude is maintained, the advance of the firing-line should also be made by certain groups moving forward while the others continue the firing. If odd men of different groups are allowed to get up and move forward as they like, all control over the firing-line will soon be lost. So long as men are creeping and crawling forward, the men in rear can fire over their heads, and there is less objection to individuals moving forward as they see a favourable opportunity for doing so. The modern rifle is a delicate instrument, and the methods available for minimizing its effects are also of such a delicate nature that only a strictly organized but elastic system will enable the highest possible results to be obtained. Bravery alone is insufficient nowadays; it must be combined with intelligence and skill in the use of ground and rifle. Even with the highest ideals and standards of training we can, in war, only get low

results, as judged by peace practices; but we want these low results to be as high as we can make them with the men and weapons that we have to deal with.

But within the "group" organization of a firing-line, the Boer War has shown the advantage of a "file" organization being also maintained as long as possible. The two men of a file (any odd file being attached to one of the files next him) should be ordered to work together in firing and advancing, and to keep together for as long as possible, even after any reinforcements have arrived; only one man of a file will fire at any time, the other trying to observe the effect of his fire, so long as volley or rapid firing is not ordered. The file system of working would begin when it is no longer possible to maintain the group system. When combined sights are ordered, each man of a file would take one of the two different sights ordered, and, as combined sights would only be used at ranges over 800 yards, this plan is more feasible than that of ordering different sections to use different sights.

However, in connection with the "group" organization of a firing-line, the following words should never be forgotten in reference to the work of group leaders at the short ranges :—*

"The importance of non-commissioned officers depends less upon their command of appointed groups than upon the

* *The Frontal Attack of Infantry*, by Captain Layman (German Army), 1873.

influence insured by their position, experience, and matured character over the skirmishers in their vicinity."

(8) The amount of ammunition to be expended at each halt must depend on the judgment of the responsible leaders. When there is nothing serious to check the advance, the halts should be long enough to enable the men to regain their breath, and, if the backsight elevation is probably fairly well known, and the objective or the purpose of the fire is in keeping with the probable efficacy of fire at the range, to fire a few rounds before moving on again. When the pauses are prolonged, owing to the efficacy of the enemy's fire, as will probably happen when the medium ranges are reached, and there is no natural cover to favour a further concealed advance, then the firing can be continued with short controlling pauses until the enemy's fire has been sufficiently subdued, by our own combined artillery and infantry fire, for the advance to be continued.

We must never forget that in all firing, whether of artillery or rifle, very few bullets of those fired strike the target aimed at, and that, therefore, ample time must always be allowed to procure a good fire effect, and this means a sufficient expenditure of ammunition correctly placed. The greater the number of men firing at the same objective, the sooner will the desired result be obtained, provided all the other conditions for an effective fire are also present.

(9) As regards the rapidity of the fire,* a slow, careful fire should be maintained at bad targets, especially if situated at uncertain long ranges. Against good targets at known ranges, and especially at the decisive ranges, a more rapid fire is necessary, in order to produce a decisive tactical result as rapidly as possible. But it is important that the men should maintain their coolness and judgment when delivering such a fire. At the decisive ranges the intimidation of the enemy is as much an object of the fire as hitting him, though intimidation by hitting gives the highest results. But it must be carefully remembered that quick firing must only be obtained by quick loading, and not by hasty aiming and jerking the trigger. And it should also be remembered that, in the long and medium ranges, accuracy of fire is more essential than its rapidity and volume. Rapid firing gained by hasty aiming has a very bad effect on the men, and soon leads to loss of control and waste of ammunition. With rifles that have to be taken down from the shoulder to load, the proportion of hits to rounds fired falls quickly when the rapidity of the firing is more than six rounds a minute. But when opposing a rush at very short range, when correct aiming is hardly possible, the rate of fire may rise to ten rounds a minute, as the object is to increase the number of

* The rates of slow, rapid, and magazine fire are laid down in section 107 (11), *Infantry Training*, 1902. See also *Combined Training*, 1902, section 3 (4), for a possible use of rapid fire.

hits, whatever the percentage to rounds fired may be. Careful aiming and careful observation of the fire are required for all firing, at all ranges, in order to get good results. *Ammunition is wasted when the mass of the bullets fired do not fall about the locality of the objective fired at.* Magazine fire, except with fixed sight and at short ranges, is of doubtful value, and is only justified at the longer ranges when used against specially good targets, and then only when the sighting for the range is known.

(10) The reinforcing of the firing-line,* from the troops nearest in rear of it, is necessary when serious gaps occur in the firing-line from losses, or from the men in it drifting to the right or left to avoid open fire-swept ground. Every man in the firing-line should be taught to move straight to his front; but what the men should do and ~~do~~ do are often two very different things. Again, when the advance of the firing-line is seriously checked at the medium ranges, it is important to strengthen the firing-line by reinforcements in order to increase its fire-power. But this should not be done if the firing-line, when reinforced, cannot find sufficient cover to protect all the men in it from suffering crippling losses from the enemy's fire. In such a case the firing-line must halt until the pressure in front, preventing further advance, is relieved by other means than its own fire. All reinforcing must nowadays be done directly to the front, the reinforcements mingling

* See *Infantry Training*, 1902, section 164.

with the men already in the firing-line. It is impossible to expect the men in the firing-line to move to a flank under a heavy and perhaps deadly fire, in order to deliberately form gaps for the reinforcements to move up into. After the arrival of the reinforcements, the division of the firing-line into groups must be carefully attended to, and group leaders appointed.

(11) The replenishing of the expended ammunition should be always borne in mind, and it should be carried out whenever and wherever it is possible to do so. The question has, to some extent, already been dealt with (see pp. 150-161), and its extreme difficulty under modern conditions pointed out. The duty of endeavouring to replace the expended ammunition must lie with the battalion commanders, who, from the outset of a fight, must seek for every possible opportunity to replace, wholly or partially, what the men in front have fired away. But, after all, perhaps the best procedure is to load up the men who are to form the firing-line with 300 rounds each, and to trust to the reinforcements sent into the firing-line bringing up with them such extra supplies as they can manage to carry, *e.g.* extra bandoliers, etc. The ammunition of the killed and wounded should always be collected and distributed.

(12) In both the attack and the defence, if victory is to be won, the advance to the bayonet assault must be undertaken. The moment for this must be anxiously considered by the leaders, because a premature effort

will probably mean disaster. Experience shows that the moment for advancing in victory, or for retreating in defeat, is usually *felt* intuitively by the men in the firing-line. Before the decisive crisis takes place there is a period of high moral and mental tension and strain. But this period is always a short one, as human nature in the mass cannot stand very much of it, and then suddenly one side bursts forward in victory and the other rushes away in defeat. But much depends on the moral, mental, and physical condition of the men at the moment when the decisive crisis arrives, and thus a great responsibility rests on the leaders of the firing-line, and also on the higher leaders, to bring their men into battle in the best condition possible, and to so advance their men through the enemy's fire-resistance, while gradually reducing the efficacy of this resistance, as to still have them in a fit condition for assisting effectually in the final decisive crisis. The whole purpose of the previous prolonged fire-fight is to assure the success of the final bayonet charge, and the men should, in peace time, be thoroughly impressed with the idea that the fixing of bayonets is a sign that it is actually safer to go on than to retire back over the fire-swept ground over which they have already advanced with so much difficulty and loss.

CHAPTER XII

NOTES ON MUSKETRY TRAINING

FROM the experience of the Boer War, we know that the deadly character of modern artillery and rifle fire, delivered by undemoralized and trained men, may necessitate so wide an extension of the men in the firing-line as to exclude the possibility of their making use of collective firing, even if they wished to do so. Hence, when opposed to a civilized foe, the conditions of a modern battle-field are often such as will demand the highest organic use of the individuality of every soldier, since a body can only operate through its members. Hence, what we have to aim at nowadays is not to instil into each soldier an "independent individuality," but an "organic or dependent individuality," by which he will become habituated to always make the very best and intelligent use of his body, feelings, mind, will, and skill that it is possible for him to do, in order to promote, not his own selfish individual advantage, but the advantage of the body of troops of which he forms an integral part for the time being. This is *true discipline*, which, in its highest

sense, is *the voluntary and intelligent sacrifice and utilization of self for the good of others*. This appeal to the highest kind of human individuality in warfare demands a very high peace-training to ensure, during the great moral and mental strain caused by the noise, confusion, and sights of battle, and by the near presence of danger, pain, and death, the discipline required to enable the men to maintain that internal or subjective self-control over themselves without which no external control is possible. Fire-discipline is as necessary as manœuvre-discipline—that is, a discipline that makes the men submit their wills without delay in times of great moral, mental, and physical strain to the control and direction of a superior will, and to act correctly on the orders received. Unless men keep cool and retain their power of judgment, they will neither fire well, nor move as desired without excitement and confusion. It is the chief object in all firing on an enemy, as in all other operations against him, to make him lose his coolness and judgment, and hence it must ever be our chief object, in disciplining our troops, to habituate them to preserve their coolness and judgment in moments of uncertainty, confusion, and danger. When this state of discipline is secured, our men will fire and move as they should under the most trying circumstances. As a matter of fact, if there was one thing that the South African War showed, it was the extraordinary courage and discipline of our troops; and with this proof of their capacity, we, of all nations, may

confidently look forward without fear to introducing the highest individual training of our soldiers, and their organized dependent individual activity. And in this task we are greatly favoured by the use of our "small company" organization in the training of our men.*

In the foregoing pages the nature of modern fighting has been to some extent pointed out, as also the important part assigned in that fighting to the prolonged fire-fight as preparatory to the final decisive bayonet assault. Except in cases of surprise, it is in this preparatory fire-fight that the foundations of victory must be laid, and hence it is absolutely essential to make this fire-fight as effective as possible. The advance of the firing-line may frequently be checked, and the firing-line may even sway backwards and forwards, according as it feels the pressure of the enemy's artillery and infantry fire, or as it is carried forward by the impulses given to it by any fresh troops sent into it from the rear. These losses and reinforcements will soon break up and mingle together the smaller

* Owing to certain preventable abuses and disadvantages that our small companies (8 per battalion) suffer from in our present military system, many officers are advocating the introduction of large companies (4 per battalion), forgetting the purely financial reasons for their introduction and continued maintenance in foreign armies. The existence of preventable abuses and disadvantages is no reason for abolishing our admirable small companies that have done so much for the nation; what should be abolished are the abuses and disadvantages under which our small companies labour in trying to perform their functions. See p. 164.

units, and this disorganization will lead to demoralization and loss of control, unless the men are made accustomed, in peace time, to this intermingling of units, and means are taken to forestall the bad results that tend to arise from it. Those means must be based on the possibilities and peculiarities of human nature, and on the characteristics that have been impressed on it by training, discipline, custom, and habit. Custom and habit are prime factors on the battle-field, for in time they become a second nature.* What men are taught and are habituated to in peace-training they will carry out in war, even in moments of the greatest moral and mental strain. And herein lies the great value and necessity of training officers and men to correct principles and methods of action, and, consequently, for the necessity of practising the rank and file in *fire-discipline*, the junior officers and non-commissioned officers in *fire-control*, and all officers in *fire-direction*; as well as in the mere act of skilful shooting with the rifle at the objectives and ranges that are customary in war, and under the conditions imposed by the presence of an enemy, as far as this can be done in peace time. And all this should be done under the leading idea of obtaining tactical effect in battle, in close combination with the other units and arms of

* We must ever remember that human nature, especially in the earlier years of life, is very plastic. It is owing to this fact that we can, by repeating acts sufficiently often, form habits, and by the formation of suitable habits form a special type of character or nature suited to our purpose.

the force engaged, and conditionally to the governing dominant tactical idea of the operation in hand.

But all the mechanism of movements on the battle-field, and all the tactical procedures for ensuring control and minimizing losses while bringing up an adequate firing-line to the decisive ranges, are only for the purpose of enabling the soldier to use his rifle effectively, that is, skilfully. Earl Roberts, speaking at Bisley on July 20, 1902, said—

“My belief is that the fate of battle in the future will be as often decided by this close-range fire (under 150 yards, see p. 148) as it has been by the bayonet charge in the past. . . . Let me, in conclusion, say how much I trust that the British public will take to heart the dearly bought experiences of the war [in South Africa], and will do all in their power to encourage our soldiers in rifle-shooting. No other qualification will make up for inferior shooting. However brave our men may be, however well drilled, well set up, and disciplined they may be, however capable they may be of enduring great fatigue, and however well they may be able to ride over most difficult country—admirable and desirable as such qualifications are—they will be valueless as soldiers unless they are expert in the use of the rifle. . . . It is on the perfect shooting of our men that the efficiency of the British Army will mainly depend.”

From what has been said, we see that the whole art of “fire-direction” is one that can only be learnt by constant practice in peace time. It involves many elements of great importance, and which require intelligence and judgment in order to apply them under

trying, and often very difficult, conditions. But it must be confessed that the work of fire-direction, sketched out in the last chapter, is often lamentably absent in our field manœuvres and exercises, where alone it can be learnt. As General Sir Redvers Buller pointed out in a memorandum issued in the spring of 1899 on certain changes that had been made in the Musketry Regulations—

“It is more easy to say what fire-discipline is not than what it is. It is certainly not intended to be a hindrance to legitimate individual action of the soldier, not a drag which so delays his fire that he is always in the position of offering his adversary the first shot. In a street row the man who does not put up his hands till after he is hit has but a poor chance. It is the same in war. Officers must always strive to give their men the advantage of the initiative [taking the lead]. Fire-discipline (*sic*) may, perhaps, be described as the training which teaches fire-unit and other commanders so to observe their men's fire that they can at every critical moment suggest the right range, the best target, and the proper description of fire, and at the same time so control their men that they have them well in hand, prepared for anything, while it teaches the men to obey automatically and immediately the orders of their commander. The manœuvre-ground, and not the rifle-range, is the proper place on which to train the soldier in the final stage of preparation for battle. On the rifle-range the soldier must be taught to use his rifle, to aim correctly, and to shoot as well as his individuality will permit—instruction of supreme importance. But, after having learnt his drill on the drill-ground, and the use of his

weapon on the rifle-range, the soldier has to be taught the combination of the two on the manœuvre-ground."

Thus drill, firing exercises, and range practices are the soldier's A B C.* Marksmanship is the basis of all higher instruction in musketry, and deliberate individual firing at fixed targets over known ranges is the only way in which the recruit can learn to gain confidence in his rifle, to overcome the difficulties of wind, light, etc., and the use of the trigger, and to ascertain the peculiarities of his rifle and his own shortcomings.† And it is only in the same way that the trained soldier can keep up his confidence in himself and in his rifle; but for this latter purpose only a few rounds a year is sufficient. Consequently, we find that our first division for musketry practice is as follows:—

1. Range practice over known ranges and level ground.

2. Field practice over unknown ranges and varied country.

Besides this, we have to consider our means of instruction, and these, again, fall into two groups.

1. The companies of a battalion.
2. The Schools of Musketry.‡

It is hardly necessary to point out the vital necessity for the company being taken as the regimental

* See *Infantry Training*, 1902, section 107 (1), and paras. 65 and 104, *Musketry Regulations*, 1903.

† See para. 102, *Musketry Regulations*, 1903.

‡ These include those in India and elsewhere, as well as at Hythe

means for training men in musketry, on account of the company having become the true fighting unit in the dispersed method of modern fighting.

The question that now arises is what should be taught at each of these two centres of instruction. The custom hitherto has been to make them overlap, and the practical result of this is that the officers and men attending the Schools of Musketry learn but little more than they could learn, or even have learnt, in their own companies. What they do learn at the Schools of Musketry, over and above what they can learn regimentally, are several pages of a book by heart about the machine-gun, rifle, and pistol, and the putting together of their parts; the use of the Watkin's mekometer; and some elementary teaching about the rifles, trajectories, ammunition, etc. With the printed regulations for regimental guidance, and the existence of controlling District Inspectors and D.A.A. Generals for Musketry in the various commands, it seems to be a sheer loss of time and labour to take the officers and men assembled at the Schools of Musketry through these regulations in detail. Otherwise there is just as much need for "Schools of Drill" as for "Schools of Musketry."

Schools of Musketry, if they are to be of any real use, should deal with matters that lie behind all range and field practices, teaching their reasons and the principles that underlie them; they should also give facilities for various kinds of experimental firing that

cannot well be carried out by regiments, or only with difficulty ; and they should teach the fitting together of the various parts of the weapons in use practically by means of wooden or metal models, and not merely theoretically, as at present. In this way the Schools of Musketry would become of real value to the Army, supplementing the fundamental company teaching. This latter should be confined to the limits of what is to be found in the Musketry Regulations, while the teaching at the Schools of Musketry should deal with a full consideration of the principles on which the regulations and regimental training in musketry are founded.

The following information is suggested as to what should be taught *regimentally* in the companies, in order to rouse the intelligence of the men :—*

The bayonet assault, the ideal of battle ; need for a fire preparation for it.

The primary qualities of a rifle—accurate sighting, flat trajectory, and rapid loading.

Method of aiming with full sight ; † the effect of wind and mirage.

The necessity for keeping the sights upright.

* See paras. 63, 68, and 69, *Musketry Regulations*, 1903.

† The greatest freedom should be allowed as to the mode of holding the rifle adopted by each man. No two men are exactly alike in conformation, and so no two can hold the same rifle alike, even though they may be equally good shots. The great thing is to get accurate shooting, and not merely a particular "regulation position," which is only a good one for the few men to whom it may be suited. See *Infantry Training*, 1902, section 113.

The importance of the physical condition of the man.

The need for keeping cool, and retaining power of judgment in moments of danger and confusion.

The necessity for skill in individual shooting.

The importance of the time and manner of pressing the trigger.

The effect of the attitude of the man on the accuracy of his shooting.

Rules for shooting at moving objects, so as to allow for rapidity and direction of movement.

Rules for shooting at disappearing objects, especially small ones; need for rapid loading and quick aiming.*

The importance of skill in snap-shooting; rules for carrying it out.

The trajectory of a bullet, angle of elevation and drop; dangerous space or zone; value of flat trajectories; all illustrated by throwing stones. The effect on trajectory of fixing the bayonet.

Effect of using fine instead of full foresight.

The use of the fixed sight; effect of fixing bayonet.

The rotation given to a bullet; its purpose; the drift of bullets.

The unavoidable errors of shooting, and the "patterns" made at different ranges.

The need for a right estimate of the backsight elevation for the range; this estimate depends on a knowledge of the range, corrected for atmospheric conditions

* See *Infantry Training*, 1902, sections 107 (11), 109, and 126, on the need for a rapid aligning of the sights on the objective.

and inclination of the line of sight. Explain the use of range shooting, and yet its unreality.

The estimation of ranges; difficulties connected with this being done accurately; probable errors; importance of observing strike of bullets; conditions under which this can be done; effects of side observations; use of field-glasses and telescope.

The influences of the pressure, temperature, and movement of the air on the flight of a bullet, and the consequent correction of the backsight elevation and of the direction of the line of sight for the range.

The influence of an inclined line of sight on the flight of a bullet, and the consequent correction of the backsight elevation for the range.

The need for looking upon the engraved backsight elevations as only approximations to the truth, that may, and usually do, require correction.

The need for aiming at the ground-line; reasons for this; difficulty of aiming at invisible objectives.

The need for training the eyesight for long-distance vision and for quick aiming.

The use of rests for firing by day and night.

The need for invisibility; how procured by colour of uniforms, extensions, rushes, low attitudes, and the use of ground and cover; importance of immobility when halted.

Use of ground and cover; and how to fire from behind cover.

The need for husbanding ammunition.

Necessity for acting on personal initiative when occasion demands.

Besides all this, the elements of which every infantryman should know, the men should be warned of the great difference between the results obtained in field-firing over unknown distances with unsignalled results, and those obtained in range practices over known distances with signalled results; and, also, the still greater difference between the results obtained in war time under the disturbing influence of hostile bullets and bursting shells with hurried and disordered movements, and those obtained in peace time when no danger exists and movements are more methodical and easy in execution.*

The company instruction would also include, as at present, the firing exercises,† the care of the rifle, and its individual and collective use over measured ranges at fixed, moving, and disappearing targets of various sizes.‡ The Boer War has emphasized the need for a

* The German Musketry Regulations lay stress on every soldier being early and continuously trained in the choice of position to be taken up with reference to the field of fire; the use of ground as a rest for the rifle and as cover to the firer; judging distance by eye up to a thousand metres; accurate adjustment of sights; rapidity in coming to the "present" in every possible position; and quickness in aiming.

† It is essential that the men should, as a matter of habit, take up correct firing positions, and that the fire leaders should give correct words of command, so that the men of different units when mingled together may not be confused with unaccustomed commands. See *Infantry Training*, section 127 (2).

‡ See paras. 53 and 60, *Musketry Regulations*, 1903. The importance of practice at short ranges is pointed out in para. 111. See also

more prevalent use of small targets than in the past, and for snap-shooting, and also the vital necessity for constant practice in the estimation of distances by eye. Another point is that, since errors of shooting are more usual in elevation than in direction, smaller lateral errors should be allowed than vertical ones, by the targets being divided up into vertical rectangular spaces, and not into circular spaces. This would encourage a more careful use of trigger, carelessness in which is one chief cause of all inaccurate shooting. To further encourage the proper use of the trigger and quick aiming, every barrack should be provided with a "jungle" with small moving objects, and cheap miniature rifles fitted for the Morris tube ammunition. This would fully pay its way if kept up as a part of the Regimental Institute.* The use of such a "jungle" could even be made part of the recruits' course of musketry with advantage and economy.

The miniature ranges of 30 yards, for use with miniature and service cartridges, that have been introduced into our service, are of the greatest value in allowing practice to go on in, or close to, barracks all the year round, and enabling the men to see for themselves the results of errors in aiming, in want of

para. 113. The men should be taught to fire with the bayonet fixed, and to keep it up for some time. This apparently is not provided for in the Firing Exercises.

* If the boys and young men of Great Britain are to be taught shooting, this will be the best and cheapest way to lay a good foundation for it, and it is, moreover, a system of universal application.

steadiness in holding the rifle on the mark, and in pressing the trigger. The advantage which practice with the service cartridge possesses over that with the miniature cartridge is that it accustoms the men to the recoil and shock of discharge of the rifle, and admits of practising rapid and magazine fire. Moving and disappearing targets can be used on the miniature ranges. But it must be always remembered that target practice, like barrack-square drill, is merely part of the soldier's apprenticeship, in which he acquires that skill and facility in the use of his tools which enables him, when trained, to use them in any manner that the tactical situation demands.

Greater stress than at present should be laid on shooting with time limit, in order to encourage quick aiming, so as to make it become a habit. The power of quick aiming is of the utmost importance in war in both snap-shooting and in firing at vanishing objects.*

The higher part of the company training will be the field practices over varied ground and unknown ranges, in connection with some sound tactical idea, which should be varied for each practice.† The men should also be dressed in the same kit as they would wear in war time,‡ so as to accustom them to firing,

* See *Infantry Training*, 1902, p. 111, and section 107 (11).

† See *Infantry Training*, 1902, section 152 (1), and *Musketry Regulations*, 1903, paras. 149 and 150. See also paras. 152, 168, and 169.

‡ That is, with full equipment, haversack, water-bottle, canteen, greatcoat, and the weight of 300 rounds of ammunition.

moving, and taking cover with all the impediment that a fully weighted equipment causes. The principal attitude for firing should be the lying-down one. In this training all questions of combining firing with manœuvring,* and of fire discipline, control, and direction, should be included. And it is especially important that this training should be constant and progressive, and be carried out continuously throughout the year, so that the men should never have time to forget the instructions imparted to them. On this subject the *Musketry Regulations of the Native Army in India* very sensibly say—

“Para. 107. Having been taught by drill and musketry instruction how to use his arms and shoot, and the formations in which to meet his enemy, the soldier has to acquire his training for battle or fire discipline.

“The manœuvre-ground, and not the barrack-square and rifle-range, is the proper place to carry out the training for battle. Having been taught his drill on the parade-ground, and to use his rifle on the range, to aim correctly and shoot as well as he can be made to—instruction of supreme importance—he must be taught the combination of these on the open plains or the hillside, according to where he may happen to be stationed.

“He must be taught to advance and retire when under fire, when to fire and how to fire, to move with a loaded rifle with safety to himself and his comrades, and be ready and able to inflict the greatest injury to his enemy. The allowance of ammunition made annually has to cover the

* See p. 270.

soldier's preliminary range practice as well as his battle training, and the amount available for the latter is not always as much as could be desired. It must not be imagined that when this annual allowance is expended the soldier's battle training is done for the year. Most valuable training can be carried on with blank, every round allowed of which should be utilized, and when that is exhausted it must be carried on without any ammunition at all. As laid down in para. 149, musketry instruction should be carried on throughout the year. Instead of detailing a squadron or double company to fire away its ammunition in a fortnight, a proportion of ball ammunition should be reserved for periodically carrying out a tactical scheme usually known as "field-firing," the intervals between the execution of such schemes being used for tactical training with blank ammunition, or without ammunition.

"In all schemes the reason for everything must be explained to the men by way of instructing them. The object and intentions of the commander in carrying out a certain manœuvre, why he halts, why he advances, why he opens and ceases fire, why he uses a certain description of fire,—all must be carefully explained; and it must be impressed on the men that the pauses in the operation are only for instructional and explanatory purposes.

"The ultimate success of the soldier in his training does not depend merely on himself. His leaders, officers, and non-commissioned officers have to play their part and perfect their training.

"Para. 149. To keep the men in constant practice, the expenditure of ammunition should, as much as possible, be distributed throughout the year, and the first and second periods of the annual course and miscellaneous practices be

executed at different times of the year ; but commanding officers, in arranging their musketry programmes for the year, will be guided by considerations of furlough, camps of exercise, marching in relief, etc."

The only objections to field practices are (1) that the men never know whether their bullets have hit or missed the target aimed at; and (2) that the tactical part of the practice may be made to overshadow that of the musketry part of it. As regards the first objection, a man's excellence in shooting is tested at his range-firing; in field-firing he is made accustomed to war conditions of unknown ranges, uncertain objectives, and unknown effects. The second objection is met by proper superior supervision. It is the field and battle conditions of firing that we want to habituate our men and officers to, and if these are combined with such simple targets as are described on p. 242, or with falling or collapsible targets, the effect of the shooting can be to some extent gauged, and the men made to feel the necessity for estimating correctly the range, for using the proper backsight elevations, and for observing as best they can the effects of their fire at all times. The highest results will be obtained if many of the field practices are carried out concurrently with the field training of the companies. The novelty of field-firing is apt to disconcert the men at first, but it very soon produces a marked difference in their individuality and an increased tendency to act more on their own initiative. The curse of all our musketry hitherto has been

its dulness and unreality, which tend to disgust the officers and men, and to make them callous about it. Unfortunately, the value of fire-discipline, control, and direction, is not felt in peace manœuvres, and hence, in the past, it has been but very imperfectly practised. It is painful to see the way in which firing orders are often given on many field days, and the utter callousness shown as to whether the men obey the orders given or not. And therefore we want to do all we can to make musketry in all its branches as interesting to both the officers and men as possible, and thus to call out their individual co-operation in carrying it out properly and instructively.*

Coming now to the *Schools of Musketry*, it is suggested that the Musketry Regulations, as such, and the way of making out forms and returns, etc., should not be taught there, but that much of what has been proposed for the regimental instruction should be gone over, theoretically and experimentally, in far fuller detail and thoroughness, as well as the whole subject of collective firing.† In addition to this, the means of testing the sighting of rifles, and of finding the "patterns" of a rifle and its ammunition, should be taught. The whole subject of the means of ensuring invisibility by means of natural and artificial cover, colour, background, avoidance of contrast of colours, distinctive

* In connection with field-firing, see paras. 152, 153, 171, 175, 168, and 169, *Musketry Regulations*, 1903.

† See paras. 333, and 334, *Musketry Regulations*, 1903.

marks, small size of target, avoidance of unnecessary movement when stationary and exposed, etc., should be fully discussed and illustrated. The subject of range-finding should be fully dealt with, and be illustrated by showing the actual use of the various instruments that have been invented, and are in use in different countries, and the fitting together of the parts of the service machine-guns, rifle, and pistols should also be taught, but only by the use of actual models. All these subjects should be, when possible, fully illustrated by various experiments, on carefully selected suitable ground, as well as the different kinds of collective and indirect firing, especially at the longer ranges, in order to show how ineffective long-range firing is apt to be under field conditions, how elevations are affected by atmospheric conditions and inclinations of the line of sight, and that nearly all firing in the field is chiefly only a matter of probability of hitting. The effects of the shape of the ground on fire effects should also be illustrated by experiments. A horse or field artillery officer should be sent to every School of Musketry to give some lectures on the use and effects of artillery fire. The history and manufacture of our arms and ammunition should be briefly explained, as also the different characters of the various "propellants" and bullets in use. Every School of Musketry should also possess a stand of the various rifles made use of by other armies and of the ammunition (dummy) fired from them.

The foregoing suggestions, if adopted, would cause some changes in the lectures to be given to the men, but these lectures need not be given all at once—indeed, they would be far better spread over a whole year. They need only be of an elementary character for the men, and would be far more practical than much of that which is now told them. We must always remember that, the better the tool, the more skilful and intelligent must the workman be, if he is to make effective use of it; and also that a high standard of training must be aimed at if we are to get even very moderate results in war.

As regards the utilization of the amount of ball ammunition allowed to each man annually, a very few rounds a year are sufficient for use *by trained soldiers* over measured ranges. Every round possible should be kept for field practices against small and rapidly moving and disappearing targets, placed either in the open or behind cover, over unknown ranges on varied ground, and be used in connection with a variety of tactical exercises (*e.g.* attacking, defending, repulsing, night-fighting, pursuing, retreating by alternate units, etc.)—all of which, however, need not be attempted with ball ammunition in each year, but some in one year and others in another. The allotment of only a limited quantity of ammunition for such practices gives the troops a very false impression of the amount and intensity of the fire that would probably be required on active service to overcome a well-armed

and well-trained enemy. All the men taken out on any one day need not be made to fire on that day;* by making different men fire on different days, with the remainder looking on or firing blank, we can extend the tactical exercises and their instructional influences over a considerable period of time; but care should be taken to make these exercises progressive—that is, rising by degrees from the simpler to the more complex ones.† We must remember that, important as individual marksmanship is, yet it is not everything. How to employ collective fire, at what distance fire should be opened when attacking and defending under different circumstances, how to avoid losses while inflicting them on the enemy, how to make use of ground and cover while moving forward, and so on, are all matters of equal importance, and contribute as much as, if not more than, individual marksmanship to the winning of battles. The art of fighting battles is a complex one, being composed of many combining factors, each of which must be given its due weight and proportion, and no more nor less; if this is not done, then the danger is at once incurred of introducing a “lopsidedness” in the resulting mode of conducting the fight, with a corresponding loss of effectiveness. It is of vital importance

* For instance, ball ammunition need not be served out to third-class shots. Such a prohibition may act as an incentive to men to improve their skill in shooting.

† See para. 160, *Musketry Regulations*, 1903, on previous rehearsal, without ball ammunition, of the actual exercises. (See also p. 260).

to obtain and maintain order and control in the firing-line, to direct and control its fire, to ensure the greatest efficacy for it, to ensure the best tactical use of it, to ensure the men moving forward when required, and in the right direction, to see that they make the best possible use of all cover, to maintain the necessary coolness and judgment for obtaining an effective fire, and to get the men of the various companies and battalions engaged to work together for the common end.

In such exercises those performed as company exercises are of the highest importance,* battalion and brigade exercises being only of use in training the smaller units to work together in organic union. And in these higher exercises it is of the utmost importance that the proper value be given to artillery fire. It is absurd to assume that the proper artillery preparation has been completed in a few minutes in order to let the men get back to their dinners. Tactical exercises, when carried out, should be properly executed, and with as much reality as possible, the men being made to take their food out with them, either cooked or uncooked. The unreal peace manœuvres of the past have brought about their own deserved penalty in South Africa.† Besides field cooking, the days employed in field exercises can be utilized for instructing the men in the loading and management of transport, and in the

* See paras. 157 and 160, *Musketry Regulations*, 1903.

† It is a great mistake to introduce into field practices supposititious troops and fictitious features of the ground.

duties and work of baggage-guards, camping, halting, bivouacking, sanitary and water arrangements, outposts, supply of ammunition, etc. *The object and purpose of every exercise and movement should be fully explained to the men beforehand, so that they may take an intelligent part in it and draw from it all the instruction possible.**

With regard to teaching men the use of ground and cover, company officers cannot do better than to take post on a suitable defensive position and make their men approach them as they would in war; men who expose themselves unnecessarily in the opinion of the observing officer should be put out of action. Such practices, however, should not be carried out by more than a few men at a time, such as a section. The men should be equipped as in war, and may with advantage use blank ammunition.

It may be stated that there is no need in every case for actual targets being used for field-firing—they only cost money; but when targets are not used, the ground chosen should be covered with sufficiently prominent rocks and large stones for the men to fire at. This, moreover, will give an excellent training to accustom the men to the use of natural objects as objectives, as will probably be the usual case in war. Small toy balloons tied to strings and made fast to sticks make excellent head-targets, and are very cheap; † but small

* See para. 167, *Musketry Regulations*, 1903, and sections 160, 228, and 236, *Infantry Training*, 1902.

† They can be cheaply bought wholesale with a machine to fill

head-targets of other materials are easily made at very little expense; and head-targets will be the principal ones met with in war. If the men can hit such small targets they will have no difficulty in hitting larger ones at medium or even long ranges when they offer themselves. Disappearing targets can be easily provided with the aid of men sitting in pits or behind other secure shelter. Moving targets representing charging men are effectively provided by canvas cylinders or gabions being sent rolling down a sufficiently steep slope.

An excellent suggestion has been made in a circular issued in India in June, 1901. A scheme involving the employment of two sides is drawn up, every man of both sides being provided with a small head-target (which may be a suitably sized bag filled with grass, leaves, or earth), on which his name is written. The operations may, if necessary, begin with blank ammunition, but, at a certain moment, the men of each side place the targets representing themselves exactly where their respective heads are at the time. One side is then withdrawn while the other side fires ball ammunition at the opposing targets for a given time. Then they are withdrawn, and the other side takes post and opens with ball ammunition for the same length of time at the targets representing their opponents. The side

them. But they should not be fastened to prickly gorse bushes, as was once done by a staff officer on a windy day, and who then reported them as unfit for the purpose of targets!

looking on keeps the ground free from intruders while the other side is firing, and its officers make notes of the faults committed by the side firing. The unhit targets of the attack can then be moved to new positions, and the fire reopened again as before. Such a practice will probably create a very great interest among the men, and will give an air of reality to many schemes if properly carried out. It will also afford facilities for carrying out stratagems, such as preparing conspicuous cover to draw fire, while placing the head targets elsewhere.

The employment of the "figure of merit" for the purpose of forming a comparative test of the musketry efficiency of units gives a most fictitious and unreal test of excellency.* The allotment of prizes as an encouragement to good shooting in field practices should be left to the judgment of the regimental officers. But this is a detail that need not be discussed here.

We now come to our last, but very practical, point, and that is the provision of the ground necessary for the proper training of our troops. Assuming that all the coming reforms in organization, armament, equipment, drills, tactics, methods of training, etc., are the very best that can be devised, yet of what real advantage will they prove if our troops are not allowed to practice them annually on a wide and unrestricted scale? It has been freely stated that the South African War has shown that our generals do not understand strategy

* See para. 19, *Musketry Regulations*, 1903.

and do not possess the art of higher leading, that our cavalry cannot scout, that our infantry cannot skirmish, that our men had no individual initiative, and that there was little or no "playing together" of the various arms, and so on. Whether such things were as bad as certain critics assert, considering the exceptional circumstances of the country operated in and the exceptional character of the enemy, need not be discussed here, but who is to blame for such faults as can be justly admitted? Certainly not our soldiers and their officers, who have never yet had any adequate means placed at their disposal for the proper training of our Army in peace for war. If the coming reforms, or even if the musketry regulations, are to result in any real benefit to our Empire, the military authorities must be given a free hand, in certain defined areas if need be, to practise their profession over sufficiently large areas of ground, under as near an approach to war conditions as possible, and without any restrictions of forbidden areas, except such rare ones as might trench upon religious susceptibilities, as might be the case in India. Our Army has never yet had such opportunities for preparing itself for the very purpose of its existence, and until our troops can freely operate on certain areas of sufficient size and suitable character, and be allowed, within that area, to manœuvre, shoot, and dig as may be required, we shall enter into the next war as unprepared and as untrained as we did into the Boer War. And of all branches of military

training, that of musketry, both on the range and in the field, essentially demands the means for its practical execution for it to be worth the money expended on it. And there are very few stations in India and the Colonies in which suitable ground for this purpose cannot be obtained within 40 or 50 miles of the station, to which troops could be successively sent for a week or more at a time to practise field-firing and the use of ground and cover, with all the necessary freedom they need, and often in conjunction with artillery and cavalry.



APPENDIX I

RIFLE-FIRE IN WAR *

To many who have only been accustomed to firing their rifles over measured ranges at stationary iron targets, and to having the results of their firing signalled back after each shot, the change of conditions that occur in a real fight comes as an intense surprise. Firing over measured ranges on flat ground in no way teaches us what will occur in battle. Let us consider what will happen in war. We are on the line of march, up and down hills, over dusty and rough roads, probably a hot sun making everything red hot, or clouds of dust from wind, or a cheery downpour of rain—everybody, of course, thinking that all this is lovely! For several nights before our beds have been on the ground, which is hardly a spring mattress, we have taken our turn at sentry and guard duties, and are lucky to get off with two nights a week at this. The ration "beef" has only been killed the day before, and the French cook has been accidentally left behind. All tends to make us weary, hot, hungry, thirsty, and anything but in good condition for good target practice. Suddenly the enemy is met with. You do not know his range. He will not show himself plainly. You hardly know where he is. And, worst of all, "ping" goes a bullet past you, or

* Reprinted from the first issue of *The Sapper*, in 1895.

through you. This incivility we had never met with from the old iron targets we have been firing at. "Ping" goes another "billet doux" past you, another, and then another, and in nine cases out of ten the effect is to give one the feeling of an approaching attack of diarrhœa. This feeling arises from the fear of death. It passes away in time with well-trained and disciplined men, but with untrained troops it often makes them bolt at once, especially if the enemy is near at hand. Meanwhile, orders are being shouted, the men are being deployed or extended, ammunition-pouches opened, packages broken up. What is to be fired at? What is the range? What elevation is to be used? Are we to fire volleys, or independently? And so on, question after question arises. Besides all this, the wind, the temperature, the density of the air, the height that the enemy is above or below you, all affect the proper sighting for the range. The order is given to open fire at a range that has been guessed. A volley from a section is fired. Every one strains his eyes to see where the bullets strike, but in most cases nothing is seen. The fool of an enemy does not signal back to us where our bullets went to—too high, or too low, or if he was hit. The firing becomes more general; the firing-line advances, halting only to fire. The enemy's bullets now come in greater numbers, while the artillery begins to send its compliments by scattering bursting shell and shrapnel about us. Men are falling, killed or wounded, our stomachs are all in our mouths, and it is only discipline that keeps us facing the danger as a duty. But what about the accuracy of our shooting? How about getting the good shooting that we prided ourselves about on the target range? Do not expect it, for you cannot get it. The men who expect good shooting usually get upset entirely by what they consider their

bad shooting, and then lose heart, and fire wildly—the very worst thing under the circumstances.

It may rightly be asked, is range practice of no value, then? It is of the highest value in some respects, for a man who is a good shot at target practice will have confidence in the power of his rifle, will be cooler and more at ease in danger than one who does not know how to use it properly. We must always remember that the value of a rifle depends chiefly on the man behind it. The French in 1870, and the Turks in 1877, had far better rifles than their German and Russian opponents, but they were beaten all the same, as they did not know how to use their superior weapons properly. So with our new small-bore magazine rifle, with cordite ammunition. It is a beautiful weapon, but only in the hands of men who know how to use it properly. The chief condition for a good fire in battle is to keep cool, and to know the sighting for the range of the enemy to be hit. Both of these are hard things to obtain. The range has to be guessed in the majority of cases, and it is a good plan to add up the guesses of, say, six men, and then divide by six (the number of men) to find the mean of the guesses. The men chosen to guess the range should be those who have shown themselves to be good at it. If ranges can be measured with range-finders, or can be ascertained from the artillery, so much the better; but even then we have to guess the proper sighting for the range, as wind, temperature, air density, inclination of the line of sight, all affect the backsight elevation to be used. Having decided on the object to be hit, and the sighting, keep cool and adjust your sights. If men do not keep cool, they get flurried, forget to adjust their sights, and do not even aim. It is very important to remember this, for if we do not adjust our sights to the range and do

not aim we cannot expect to hit. We want our fire to hit.

We have given up painting ugly faces on shields, and on our uniforms and flags, wearing hideous masks, using fearful yells, and beating tom-toms in order to frighten away the enemy. We want to frighten him into bolting by hitting him with our bullets. Supposing we are firing at an enemy who is about 800 yards away, the angle of elevation given by the sighting is about one degree with our present rifle. A very slight movement will make the rifle bob up another degree or two, sending the bullet well over the enemy to 1200 or 1500 yards. And the more we miss, the more ready he will be to stay, for he begins to despise our fire ; so the first thing that must always be done, in order to get as good a fire as possible in battle, is to choose your target, adjust your sights for the supposed range, and the atmospheric and ground conditions, and keep cool in aiming and firing, while always watching for the fall of the bullets, to see if they will throw up any dust, so that we can alter the sights if necessary. But this is not all. We want to try to keep the men cool as long as possible, and the best way to do this is to keep the fire under control. By so doing the men are kept in hand. But as volleys will not be possible after a while, from the sections getting mixed up and from the men getting too excited to listen to words of command, even if they can hear them in the firing,—for such a state of things, it is very important that men should be trained to stop firing when they hear a whistle. A rapid fire is usually a bad and useless fire. The magazine rifle must not be looked on as a rapid-firing weapon, but only as a rapid-loading weapon, for the time taken to aim must not be shortened, but only the time taken to load, because an unaimed fire is generally only a waste of

ammunition. It is very important that every man should listen for orders or for a whistle sound to cease firing, for while we are firing in one direction the enemy may, suddenly and unexpectedly, turn up in another and more threatening direction, and if we cannot turn the fire on him it will be a bad thing for us. So for one's own safety we should keep cool, listen for orders, and save our ammunition all we can, as we do not know when we will get any fresh supply of it, and a man's life may depend on his having even a single bullet at the end. If we use up our ammunition the enemy must get the better of us, as the Zulus did at Isandlwana, when we had no more cartridges left. Look upon every round of ammunition in battle as if it was a £100 note, and only fire it when you think you can get a hit, or when ordered to fire in a volley, for in all volley firing the bullets spread on the ground for over 100 yards up and down the range, and by their spread we hope that some of the bullets will hit. Another very important point is to aim low. We all tend to get excited in battle, and excited men always fire high, and so it is good always to aim at the ground-line of the object aimed at. In the old flint-lock days English troops were ordered to fire at the enemy's boots, who were probably only 50 yards away! There are only two ways of saving one's skin in battle—one way is by hiding behind cover, and the other way is to shoot your enemy. The second way is the best way of the two, though they can usually be combined. But it is no good taking cover if you cannot see the enemy from the cover. If you fire without seeing what you are firing at you are throwing away your £100 notes uselessly, and doing no good. So never stop behind cover which prevents you seeing the enemy, for while you are so hidden he may advance close to you unseen, and get a bull's-eye when you

show yourself again. With regard to the range at which fire should be first opened, the rule must always be to get as close as you can before opening fire. A couple of hundred yards' change of range makes no difference to artillery, but it makes a very great difference in rifle-shooting. The general idea is that, when we know the elevation range, firing may be begun at about 1200 yards, and if we have to guess the range, then 800 yards should be looked on as the greatest range, for opening fire. For individual firing, 800 yards is the outside limit for opening fire. If the enemy offers a bad target, then try and keep the greater part of your fire for still shorter ranges. These remarks only apply to serious business, though often it is good to let men fire a few rounds at the longer ranges, in order to ease their pent-up feelings. No one likes being shot at without shooting back in return; but, except for this one object, endeavour to keep all the ammunition you have for the shorter and more decisive ranges. We have all seen boys throwing stones or snowballs at one another, and that when they are far apart it is only by chance they hit one another, but the fun begins when they get close to one another. The same thing happens in battle, only there we throw bullets at one another, and not stones and snowballs. The great value of the modern magazine rifle is that up to 500 yards it keeps the bullet under the height of a man from the ground, and that you can load more rapidly and be ready to shoot quicker. These are the chief properties of the new rifle that we should try to make use of. Hence our rules for shooting in battle should be, (1) above all to keep cool; (2) make up your mind what is to be fired at; (3) guess the range and adjust the sights for it; (4) use controlled fire as long as possible, and watch for the dust thrown up by the bullets; (5) when firing

individually, stop firing when you hear a whistle or an order ; (6) save your ammunition all you can, and to do this (7) only open fire at the shortest ranges you can get to without undue losses ; (8) try to seek safety by shooting the enemy rather than by seeking cover ; and (9) get as near the enemy as you can. But you may ask if you do not run a chance of being shot while doing this. Certainly ; but for what else are you wearing his Majesty's uniform ? The soldier's duty in battle is not only to kill the enemy, but to boldly risk being killed in the performance of this duty. " Kill and ready to be killed " is the soldier's motto.

APPENDIX II

EFFECT OF ATMOSPHERIC CONDITIONS, AND INCLINATION OF THE LINE OF SIGHT.

Our rifles are sighted for ranges measured along a horizontal line of sight, and for an atmospheric density represented by a barometer pressure of 30 inches and a temperature of about 60° Fahr.* with no wind.

The simple formula giving the effect of *atmospheric pressure and temperatures* different from the standard one is as follows † :—

$$\text{Alteration in range} = \frac{\text{range}}{1000} \{(T-60) + 15(30-B)\}$$

$$\text{or} = \frac{\text{range}}{1000} \left\{ (T-60) + \frac{15A}{1000} \right\}$$

where at the time and the place of firing—

T = temperature Fahrenheit of the air in the shade ;

B = barometer-pressure to the nearest tenth of an inch ;

A = altitude in feet above the sea-level.

* The moister the air the less its density, but in the field we have no means of ascertaining the amount of the moisture, and at the most its effect is small.

† The practical accuracy of these simple formulæ have now been fully established. They were first put forward by the author in 1886. But they do not include the effect of the temperature on the cordite charge (see p. 75.)

The second formula is not quite so accurate as the first one, but it is sufficiently accurate for all practical purposes. With a little practice, either of the above formulæ can be mentally reckoned with ease.

If T is less than 60° , the temperature correction has to be deducted, and the range shortened to that extent.

There is no known formula that will give the effect of wind on the range, but a head wind will check the flight of a bullet, and so requires an increase of elevation, while a rear wind will increase the flight, and so requires a decrease of elevation, in proportion to the strength of the wind. A side wind also requires an increase of elevation, because the air is denser and the bullet travels along a circuitous route. Wind allowance is a matter of practice and experience.

The effect of an inclination of the line of sight is given by the following formula * sufficiently accurately for all practical purposes :—

$$R_1 = R \frac{\cos(i \pm e)}{\cos^2 i \cos e}$$

where the $+$ sign is for uphill, and the $-$ sign is for downhill, firing, and where—

i = the upward or the downward angular inclination of the line of sight with the horizontal ;

e = the angular rifle elevation, always above the line of sight ;

R_1 = the range on the line of sight, inclined i degrees for a rifle elevation of e degrees above the line of sight ;

* The practical accuracy of this formula has been verified by experiments made in India in 1898. The formula is, strictly speaking, only accurate for *vacuo* conditions, but the errors involved in applying it to atmospheric conditions are within the ordinary errors made by the mass or collective fire of a firing-line.

R = the range on a horizontal line of sight for a rifle elevation of e degrees above the line of sight.

When firing *downhill*, the inclined range R_1 is always greater than the horizontal range R , and the difference increases with the inclination (i) of the line of sight. When firing *uphill*, R_1 is also greater than R when i is greater than $2e$; but when $i = 2e$, $R_1 = R$; and when i is less than $2e$, R_1 is slightly less than R .

The formula* correcting R and e , under normal atmospheric conditions, for the Lee-Metford rifle and its ammunition is—

where e = minutes of arc,

r = horizontal range in yards (for e) divided by 100,

up to 700 yards—

$$e = \frac{1365}{17 - r} - 81^{\circ}$$

from 500 yards up to 2000 yards—

$$e = \frac{18000}{45 - r} - 417$$

or from 1000 yards up to 3000 yards—

$$e = \frac{16033}{42.7 - r} - 397$$

These formulæ give the true angles of elevation, and not the engraved ones on the backsight, as these latter are converted by the “jump” into the former at the moment of firing.

As regards the flatness of the trajectories of inclined ranges, the corresponding ordinates (measured perpendicularly to their respective lines of sight) *proportionately*

* Worked out by Captain C. F. Close, R.E.

situated on the inclined and horizontal ranges, for the same rifle elevation, are the same; and since the inclined ranges are, generally speaking, greater than the horizontal ranges for the same rifle elevation, it follows that the inclined trajectories are much flatter than the horizontal trajectories of the same length of range.

The results of the formula giving the inclined ranges for given rifle elevations and inclinations of the line of sight for a given rifle and ammunition can be graphically plotted in diagrams (see next page), and although these diagrams may not be of any practical utility in the field, yet a study of them will inform the mind as to what will happen under different combinations of rifle elevation and inclination of line of sight. The diagrams show that, with the present Lee-Metford rifle and its ammunition, we need not seriously consider the effects of the inclinations of the line of sight for ranges under 500 yards, and that for longer ranges we need not consider the effects of any inclinations of the line of sight when these are under 15° for uphill firing, and 10° for downhill firing; but for greater inclinations than these the effects of an inclined line of sight become considerable, especially for the steeper inclinations and longer ranges, and especially so when these two factors are combined.

Example.—What is the inclined range for the 1500 yards rifle elevation when the barometer pressure is 28.72 inches, temperature 90° Fahr., and inclination of the line of sight, or i , is $16^\circ 45'$ downhill?

$$e = \frac{18000}{45 - 15} - 417 = 183' = 3^\circ 3'$$

$$\text{Inclined range} = \frac{1500 \cos (16^\circ 45' - 3^\circ 3')}{\cos^2 16^\circ 45' \cos 3^\circ 3'}$$

$$= 1590 \text{ yards}$$

$$\left. \begin{array}{l} \text{Correction for atmo-} \\ \text{spheric conditions} \end{array} \right\} = \frac{1520}{1000} \{ (92 - 60) + 15(30 - 28.72) \}$$

$$= +81 \text{ yards.}$$

$$\text{Hence inclined range} = 1590 + 81$$

$$= 1671 \text{ yards.}$$

Hence the difference between the theoretical range engraved on the backsight and the real range is 171 yards.

RULES FOR CORRECTING NORMAL BACK-SIGHT ELEVATION.

ALTITUDE.

1. The barometer approximately falls $\frac{1}{10}$ inch for every hundred feet above sea-level, where it is 30".

2. Take the altitude to the nearest hundred feet above sea-level.

3. Multiply the number of hundreds of feet by 0.15 to find barometer-pressure.

4. Multiply this product by the number of hundreds of yards in the range.

5. The result must be subtracted from the normal range if the barometer is under 30", and added if the barometer is over 30".

Example.—Actual range = 2145 yards = 21.5 hundred yards
altitude = 4765 feet = 48 hundred feet

$$48 \times 0.15 \times 21.5 = 155 \text{ yards}$$

Corrected range for altitude = $2145 - 155 = 1990$ yards.

TEMPERATURE.

1. Multiply the number of degrees above or below 60° by 0.1.

2. Multiply this product by the number of hundred yards in the range as above.

3. If the temperature is above 60°, the result must be subtracted; if below, added to the actual range.

Example.—Thermometer is 95°, range is 2145 yards.

Now, $95 - 60 = 35$, and $35 \times 0.1 \times 21.5 = 75$ yards.

Range corrected for temperature } = $2145 - 75 = 2070$ yards.

SLOPE (UP OR DOWN HILL).

1. The ranges are marked in the margins of diagrams in hundreds of yards.

2. The vertical lines show intervals of one degree from 0° to 50°.

3. The horizontal lines are 20 yards apart. Smaller distances may be judged by eye.

4. At each range indicated in the margin a horizontal line and a curve meet; only certain curves are shown.

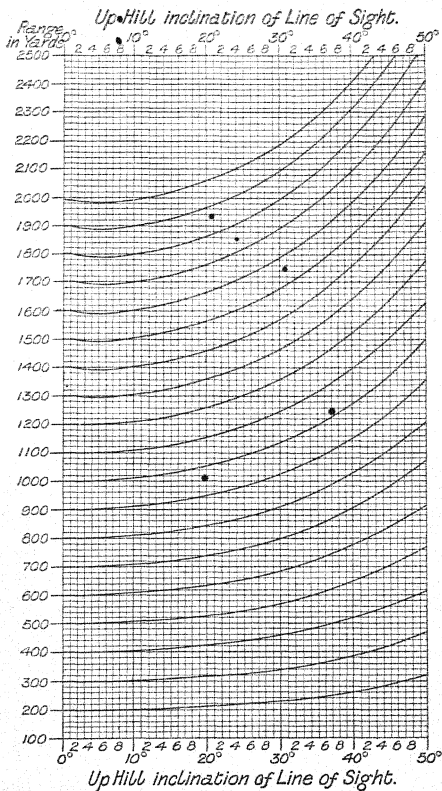
5. The divergence between the curve and the horizontal line, as measured on the vertical line showing the observed degrees of slope, shows the number of yards by which the range must be reduced.

SUMMARY.

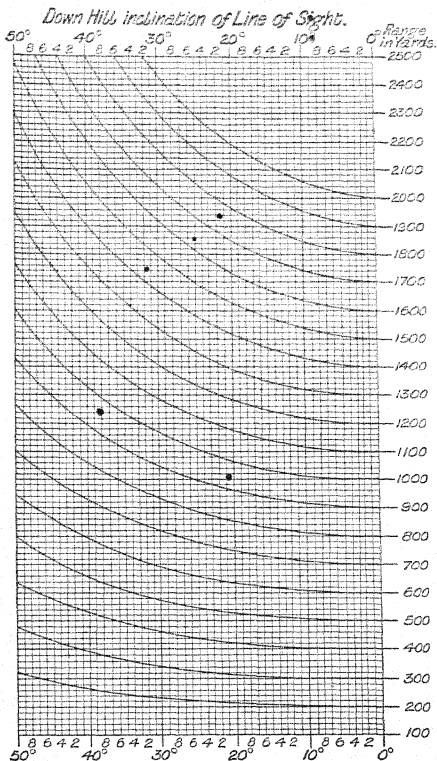
Tabulate the corrections as below:—

Actual range			X
Correction for altitude	.....	—M	
„ „ slope	.....	—N	
	Total	—P	
Correction for temperature	.....	+K	
	Total	+Q	
Corrected range.....			Y

Sight the rifle to the nearest 50 yards to this result.



Note.—This diagram is for the Lee-Metford rifle and its ammunition.



Note.—This diagram is for the Lee-Metford rifle and its ammuniti

[To face p. 258.



APPENDIX III

EXTRACTS FROM VARIOUS ANNUAL REPORTS ON MUSKETRY IN INDIA

THE Annual Reports on Musketry Instruction in India, from the year 1890-91 and onwards, contain much instructive matter on account of the facilities that are given from time to time in India for all kinds of experimental and field firing. The good work began by Major-General Sir Ian Hamilton under Earl Roberts has been ably continued by the late Major-General Sir W. Symonds, by Major-General W. Hill, and by Colonel C. L. Woolcombe, who have been the successive Assistant-Adjutant-Generals for Musketry in India during the last decade. It is chiefly owing to the influence of these officers, and of those working under them, that the great progress made of late years in the use of the rifle in battle is due, for the military authorities at home have practically only followed in the steps of those in India in these matters.* And the past series of the Annual Reports on Musketry Instruction in India are most interesting in the way they show the gradual improvement of the troops in India in the real

* It was in 1886 that the attention of the troops serving in India was for the first time specially directed to the urgent necessity that existed for the acquirement and maintenance of a high standard of fire-discipline, and that the musketry regulations for the Native Army in India were brought into line with this necessity.

co-operative use of the rifle in battle. But they have a further value in that they enable every officer to realize the weak points that had been noted, and the directions in which greater care and attention are needed to be paid in the battle instruction of both officers and men.

FIELD-FIRING.

Before 1886 musketry drill and tactics were completely disassociated, and the early efforts to bring about their association were by no means easy, as a great many prejudices and misunderstandings had to be overcome. Consequently, in 1888 Earl Roberts called the special attention of all concerned to the importance of the general subject, and at the same time expressed his high personal appreciation of field-firing as a military exercise, and his belief that, when carried out after due preparation, and with the requisite energy, it afforded unrivalled opportunities of practice for the realities of the battle-field.

Within three years of the issue of this order, a most marked improvement was realized; tactical schemes were better thought out, positions more judiciously selected, and greater realism introduced in the movements carried out and the fire delivered. This was particularly noticeable in the combined working of the several arms in mutual support, including the reconnaissance of the enemy, careful preliminary dispositions, artillery preparation, an assault by infantry, and a subsequent pursuit or the repulse of a counter-attack. Occasionally the attack was preceded by a night march, and the assault of a position in front became invariably supplemented by fire from a flank, either of ball, or, when this is unsafe, by parties firing blank cartridges. Preliminary rehearsals of the ball practice

with blank were frequent, and in most cases proved useful, affording as they did an opportunity for pointing out mistakes, and so preventing a "waste" of the small allowance of ball ammunition that had hitherto been only available, as a rule, for such practice. Moreover, the beneficial result on the different arms was most apparent. The artillery learnt to come into action and to find the range quicker, and their fire-effects and fire-control became greatly improved. The cavalry learnt to appreciate service conditions, though complaints were still made that their dismounted action was too slow and deliberate, which deprived their superior mobility of much of its value, and would in war expose them to heavy and unnecessary losses. The infantry found that they could maintain their old steadiness of drill with a greatly increased standard of fire-effect, owing to the advances they had made in fire control and discipline, in the direction of well-delivered words of command, in the naming of objectives by the unit commanders, and in the correct delivery of volleys so far as the simultaneous discharge of the rifles was concerned, which, however, do not constitute complete efficiency. Besides these points, other matters of detail began to be carefully attended to with satisfactory results, such as range-finding, the supply of ammunition to the firing-line, representation of casualties, the collection of the ammunition of casualties by supernumeraries, signalling, and medical aid to the casualties. Finally, the positions attacked were well selected, and were often laboriously and elaborately prepared so as to represent as far as possible the appearance of an actual enemy, and made as realistic as possible by the employment of moving and vanishing targets, powder bombs, Ghazi balls, etc.

This was a good record of improvement within three

years, but many things had still to be learned, chiefly in the directions of bringing the firing under strict control from the moment the first shot was fired until the close of the operations, and of better utilizing the individual skill in shooting now so general in the ranks. The ideal held up before the Army in India was that its regiments should be able to maintain, throughout the whole of the varying phases of a general engagement, the most effective fire that their rifles and men were capable of. To promote progress in this direction, attention was drawn to the principal shortcomings that had been noticed; these were, that the various commanders of the force, of the different sections of the firing-line, and of the companies in each part of the firing-line, rarely explained clearly and efficiently their wishes to those under them as to what should be done or what should be fired at. The result was that, though the three arms had learnt to combine in mutual support, yet the combined action of the fire-units to maintain a continuous and concentrated succession of firing upon certain selected portions of the enemy's position was seldom seen, which tended to make the entire character of the fire to become vague, desultory, and feeble.

It had been pointed out by Earl Roberts that, at the decisive ranges under 800 yards, the responsibility of seizing all the vantage ground in the immediate front, and of bringing the most effective fire possible to bear upon the enemy, rested mainly with the subordinate leaders, and that the battle is consequently almost entirely in their hands. The company leaders were no doubt specifically alluded to in this connection, but much of their influence in the fight in its concluding phases must undoubtedly, in the heat of the conflict, depend upon the intelligent initiative of the section and subsection leaders.

And hence the importance of giving them careful instruction and constant practice in such matters, especially at moving and vanishing targets, before they take part in field-firing. The chief failings that had been noticed in the case of non-commissioned officers were, the confused and uncertain manner in which objectives were designated to the men; the observation of the fire of their own or of neighbouring sections, or of the artillery, as the case might be, with a view to correcting the backsight elevation if necessary, was carelessly done; not sufficient care was taken to see that their orders regarding the sighting and the direction of the fire was carried out; and spare non-commissioned officers did not assist the unit commanders in supervising the men.

From the foregoing considerations, and the experiences derived from the results of field-firing with its combination of collective and individual firing, at long and short ranges, at stationary moving and vanishing targets at unknown distances, together with the experience it gives in fire discipline and control, shows that field-firing is the most practical, while at the same time being the severest, test that can be imagined of the standard of efficiency to which the fire of the troops engaged has attained. It must be borne in mind that though, in field-firing, much depends on the accuracy of the fire delivered, yet good results are often equally dependent upon its intelligent direction by the subordinate leaders. Company, section, and sub-section leaders are the individuals chiefly concerned in this matter, and therefore they should be given every opportunity for practice that can be afforded them. At field-firing, complete decentralization of command becomes obligatory at an early stage of the advance. And it should be borne in mind that the power of accepting responsibility does not grow spontaneously to meet a single occasion,

such as annual field-firing, but that it must be carefully instilled into the non-commissioned officers throughout the whole course of their ordinary military training, as the main justification of their existence.

The foregoing is the substance of the remarkable report written in 1891 by Major-General Sir Ian Hamilton, on the result of the new *départure* begun in 1886 by Earl Roberts; and in the field-firing of that year special stress was laid on the order relating to concentration of fire given on p. 121, and the custom of interrupting the attack at various stages in order to count the hits was given up, because instruction in fire-discipline, and the application of musketry instruction to the tactical necessities of the moment, were considered of more importance in carrying out field-firing than a mere record of hits.

The Report of 1891-92, also written by Sir Ian Hamilton, points out that, as musketry drill is the foundation of a good fire-discipline, officers and non-commissioned officers must give proper attention to it. With the issue of the Lee-Netford rifle and the introduction of smokeless powder, the importance attaching to the fire-command of companies and smaller units is still further accentuated, and, as had been pointed out, the conduct of the battle at the decisive distances will rest almost entirely in the hands of the subordinate leaders. The men were reported to be generally steady, and to handle their arms with precision and neatness; individual skill was satisfactory, fire units were more amenable than formerly to the orders they received, and grasped their significance more readily; but, to make the most of their capabilities, it is necessary that unit commanders should be educated to a thorough knowledge of what would be required of them in the field.

Though fire-discipline had improved of late years, yet

much remained to be accomplished. The manipulation of large masses of infantry fire was rarely practised by senior officers, and thus the concentration of the fire of numerous fire-units on a fixed or varying objective was only but occasionally introduced. On the other hand, the fire-unit leaders were left too much to select their own objectives, which only led to a desultory and scattered fire. The designation of objectives was also imperfectly done. Until the importance of a combined and intelligently controlled fire-action on the part of the units is fully appreciated, no further advance could be looked for. Constant practice under trained supervision was necessary to eradicate the chief failings, and also by these means only can a perfect mutual confidence be expected to arise between the commander and the commanded.

Company exercises were recommended during which targets are suddenly made to appear on a flank or in rear, the service of actual mounted men being obtained when possible to simulate charging or retreating cavalry, and the company commander should be required to take suitable action without hesitation and on the spur of the moment. At the conclusion of the exercise the instructor was to criticize the whole performance—the method of bringing up the men, the time occupied, the suitability of the description of fire used, and its direction and concentration, the fire-control exhibited by unit commanders, the method of giving commands and pointing out objectives, the work of the supernumeraries, the accuracy of the distances given, the fire-discipline of the men, how far ahead of a moving target the men were ordered to aim, the appreciation shown of the requirements of the moment, and such other details as the circumstances of the exercise demanded. A badly executed practice had to be repeated. Precision

in drill and movement is of minor importance in these exercises ; the essential things being observation of service conditions, intelligent and quick appreciation of the requirements of the case, control and direction of fire, the power of judging distances by unit commanders, and the steadiness and skill of the men in handling their arms. With company and section exercises of the foregoing description, commanding officers would soon have their junior officers and non-commissioned officers so instructed as to be able to properly act their part in field-firing.

Fire control and discipline cannot be improved at field-firing any more than drill can be learned at an inspection. Hence battalions cannot afford to trust to the experiences gained at field-firing or at field days for their fire control and discipline. It is in quarters that these essentials must be mastered, and then only by allowing captains and section leaders to take their fair share of the work without undue interference.

The reports of the field-firing show that *judging distances* was the weakest spot in the musketry training of the troops, and yet, if the correct elevation is not given to the backsight, marksmanship and fire-discipline are alike thrown away. Consequently, it is pointed out that the higher education of a selected few is preferable to practising the majority of men who show no aptitude in the matter. It is also suggested that good, small, portable range-finders should form part of the equipment of every company officer, because with the new longer-ranging rifle the zone of decisive action is pushed out to ranges at which judging distances is harder and yet more important than in the past. A range-finder is more essential to infantry than artillery, who can find the range by percussion shell, and a range-finder in practised hands should

be far more dangerous to the enemy than any revolver. Thus the art of range-finding should rank as an important qualification for the command of a company.

The report shows that the fire-effects achieved in the Miranzai Expedition were far in advance of those gained in other past wars, although all that could be seen to fire at were puffs of smoke and standards, showing the good results that had been arrived at by the work of the preceding years.

The Report for 1892-93 was written by the late Major-General Sir W. Penn Symonds. It points out the need for the correct giving of the words of command at all firing exercises, so that the men may not be confused at critical moments by commands that they are not accustomed to. Stress was also laid on aiming drill, to accustom the men to the quick and correct adjustment of sights. The field-firing during this year had shown improvements in the shooting, the preparation of "general" and "special" ideas of the operations, the control and direction of the fire by junior commanders, the leading of the smaller units, the attention paid to the supply of ammunition to the firing-line and its collection from casualties, the adaptation of formation to ground and circumstances and use of cover, the giving of clear explanations to all ranks before starting of where they are to go and what they are to do, and the absence of noise and confusion. But the following shortcomings were noticed: Neglect to rehearse the operations with or without blank ammunition so as to prevent avoidable mistakes being made; the tendency of senior officers to go into the firing-line instead of controlling the fight from the rear; volley firing at too short ranges and with too large units; weak-sounding whistles; recruits not being taken out to see what was done; range-finders used at ranges under 800 yards; the omission of military

precautions in approaching hostile positions ; the maintenance of independent firing previous to the final assault for too-prolonged periods ; and the use of blank ammunition by the co-operating artillery instead of shell.

The Report of 1893-94, by Sir W. Penn Symonds, impresses the necessity for the union of fire-discipline and fire-control with the company and battalion drill and manœuvres. Thus, as a battalion in line only changes front to enable its fire to be turned in a more favourable direction on an enemy who is supposed to have appeared there, such a change of position should be followed up by opening fire either when the movement is completed or as the companies get into position. All extended-order drills should also include firing exercises as well. The field-firing reports for this year showed a marked progress, especially in tactical matters, such as smartness in reforming after assaults, taking up pursuits, and directing attention to the enemy's reserves. Reinforcing the firing-line had been carried out in three different ways, viz. (1) by sending reinforcements directly forward and retelling off the firing-line into fire units after this had taken place ; (2) by making the units in the firing-line close to a flank, and bringing up the reinforcements into the gaps thus made ; and (3) by using the second method up to about 500 yards from the enemy, and the first method after that. This third method was considered the best, as it had the advantage of keeping units together for as long as possible under their accustomed leaders. Advances by rushes were carried out by alternate units, varying from a section to half the firing-line of a battalion, the alternate units keeping up a fire on the enemy while the other one advanced. But advances by alternate small bodies are dangerous, as they mask the fire of the men left temporarily

in rear. In open country it was considered best to advance by half-battalion frontages, and in the case of smaller forces by half the firing-line.

The following errors were noted: The cavalry were sometimes made to dismount and fire during the reconnaissance of positions under circumstances tactically incorrect, whereas the carbine fire of cavalry is best used in pursuit; * the cavalry reconnaissance of positions was imperfectly done—they were too slow in getting into dismounted work, while the led horses were either unnecessarily exposed or kept too far away; sufficient time was not always given to the troops told off to the flank attack to get into position so as to co-operate opportunely with the frontal attack; independent firing just previous to the assault was kept up for too long a period, either from the whistles not being heard or from the assaulting troops not coming up soon enough; range-finders were used at under 800 yards from the enemy; the advance by rushes was begun too soon, which in war might disastrously fatigue the men; infantry carried too many rounds in their pouches, which prevented the supply of ammunition being practised; the whistle was abused by being used so much that the men finally paid no attention to it; many battalions turned out very weak instead of turning out as strong as possible; and in many cases the artillery was not used at all, or only fired blank, although great importance is attached to the co-operation of artillery with shell. In one field-firing report, the chief umpire, who had placed himself 800 yards from a flank of, and in line with, the position attacked, states that the troops unnecessarily exposed themselves, and did not take full advantage of cover; that *the origin of fire in*

* Rather, in seizing and holding important defiles and positions until the infantry in rear arrive.

the case of troops using smokeless powder could not be localized ; and that the advance of a long firing-line by alternate half-companies was noticeably defective, owing to the half-companies left behind being unable to fire with safety through the gaps between the half-companies in front.

The Report for 1894-95 was written by Major-General W. Hill, and complaint is made that the fire discipline and control practised during drills and manœuvring existed in many cases only in name.* The necessity for combination of strict drill and fire tactics is insisted on. Drill affords the quickest means of moving troops in an orderly manner from one position to another ; but such evolutions are but a means to an end, and that end is the most effective use of the rifle. And if accuracy in giving commands is considered necessary for manœuvring troops, it is still more necessary when the rifle is in actual use than in the preliminary movements, which are only intended to give it its most favourable opportunity. When the crisis has arrived for the delivery of fire, men's nerves are at their highest state of tension, and any inaccuracy or undue hurry in giving the words of command may produce the most injurious results. The following defects were noticed : The independent firing just before an assault was unnecessarily prolonged, and in some cases was only stopped with great difficulty ; the time occupied in the attack was too long ; company commanders did not act sufficiently on their own responsibility ; and the whistle was used too much, and those in use were often of insufficient power. A long, shrill whistle-sound, to be repeated by section commanders, is a

* It must be remembered that new battalions arrive yearly in India, and that they have to be trained up from the beginning, as it is only rarely that real field-firing is possible in other stations than those in India.

signal for the fire to stop, either in order to continue the advance, or to change the objective, the sighting, the kind of fire, etc., or to steady the men, if they are beginning to fire excitedly. The need for giving infantry an opportunity of becoming better acquainted with the tactics and fire-effect of artillery is insisted on, and that, therefore, time should be given for the artillery to do its work before the infantry advance. Even if the artillery cannot fire with safety, it should take up correct position, and remain in action to show the infantry where they would be in reality in battle; it may for this purpose even advance with the infantry to the closest ranges, which may have to be done in war on certain critical occasions. There was a tendency on the part of officers commanding an attack, if infantry officers, to request the artillery commander to afford a general support to the infantry, and then to take no further notice of what the artillery did. This should not be permitted, as every arm should be given such orders as will ensure its carrying out the general tactical idea of the officer commanding the attack. The importance of regimental *rifle clubs* in promoting marksmanship is insisted on. Through their influence, men become exceptionally expert in the handling of their arms, they afford congenial occupation to the men during their leisure time, and they give the men more confidence in themselves and in their rifles, and ensure the rifles being better taken care of.

We need not follow the Annual Reports any further, but the foregoing *précis* of the Reports dealt with show the immense care that has been taken in India for the last twelve years or more to improve the battle-firing of our troops, and the wisdom and foresight that has been shown in what has been done. In fact, if the work had been begun earlier, and if our troops had the same facilities in

other countries as they have in India (though even there to an insufficient extent) for perfecting them in battle-firing and procedure, we should not have made such amateurish mistakes in battle as marked the earlier phases of the Boer War.

One point of great interest in the Annual Reports are the detailed accounts of the field-firings, that have been carried out as closely under war conditions as the safety of the men permitted. The following comprehensive list of questions * had to be replied to in every case, accompanied by a plan showing the features of the country operated over:—

1. Dress of Cavalry and Infantry.
2. Number of rounds issued per man.
3. At what distance from the enemy's main position did deployment for attack take place?
4. Were scouts and signallers employed?
5. At what distance from the main position were the supports merged into the firing-line?
6. When and in what manner did the reserve reinforce?
7. The second and third lines. Were they represented? If so, state strength, and how used.
8. How was the advance conducted, and how were the distances preserved?
9. What range-finder was used, and at what distances?
10. Were casualties represented?
11. Fire-control. How was this maintained, and how were the words of command given?
12. Fire-discipline. Use of whistle.

* As regards Question 13, it should be noted that volley firing was much more in use in the days of large-bore rifles and black powder giving off volumes of smoke than nowadays. For present-day use this question would have to be differently worded.

13. Volleys. How delivered—company, half-company, or section?

14. Objects. Were they named by half-company and section commanders?

15. Concentration of fire. Was this attended to?

16. Were the objects of the defence placed as on service?

17. Was any ammunition issued during the advance, and in what manner?

18. Independent fire. At what distance commenced, and for how long continued?

19. Flank attack. How was this carried out? Strength, objects, etc.

The answers to this list of questions were accompanied by the general tactical idea of the field-firing, any general instructions concerning what was to be done, a general history or an account of how the operation was carried out, and the remarks of the chief umpire and of the general officer commanding the district in which the operations took place. In this way a full and detailed record was obtained of all that occurred, including faults. In some cases company commanders were ordered to note the time and to keep a record of the approximate number of the rounds fired by their men at different distances, and of the objects at which they fired.

A study of the published reports of the field-firing are very instructive in many ways. The following points, taken at random, are noted among others:—

Casualties were often arranged for, to the extent of 25 per cent. of the men engaged, and included officers of all grades, even the officer commanding the force and his artillery commander, and on one occasion a corporal was left in command of a company. When the casualties were

high, the majority of them were reformed and brought up as a second and third line; the remainder were given tickets showing the nature of their supposed wounds, and were dealt with by the medical officer.

The medical arrangements comprised the formation of collecting and dressing stations. Sometimes these were badly placed, and the need of practising stretcher-bearers was shown, especially over rough ground.

The supply of ammunition was generally practised, and the ammunition collected from the "wounded" casualties and distributed. Several complaints were made of the small amount of ammunition that was usually available for field-firing, from ten to twenty rounds only per man.

The need for good signalling arrangements was frequently illustrated, in order to allow of the timely co-operation of widely separated bodies. On one occasion two battalions failed to come into action through a mistake in the orders sent to them, and the flank attack was prematurely made through the unintended receipt of a vaguely worded order which was meant for the commander of the frontal attack.

The judging of distances was frequently very wrong. On one occasion 1350 yards was estimated at 700 yards, 850 yards as 600 yards, and 650 yards as 380 yards. The umpires were often given key maps with the distances from the targets marked on them of several points lying on the line of advance. The difference between the range given by the range-finder and the backsight elevation found suitable for the range was often found to be as much as 200 yards at ranges of about 1500 yards, for which, therefore, the 1300 yards elevation had to be used. Watching the strike of the bullets with field-glasses was only found possible in a few cases where the conditions happened to

be favourable. The effect of atmospheric conditions was more than once noted. On one occasion a haze in the morning caused all the ranges to be over-estimated, while, during the clear weather that followed it, all the ranges were under-estimated; the clear atmosphere after rain also caused ranges to be under-estimated. Whenever the sun was in the face of the men, their shooting became bad, while targets backed by the setting sun could hardly be seen.

Complaints were sometimes made that the sights were not altered as the ranges decreased, and that fire commanders often gave most vague descriptions of the objective to be fired on, such as "At the enemy in front."

The need of more practice of firing at a moving object, even at a close range, was incidentally shown by the number of rounds fired at a frightened "chink" that started up in front of a British battalion and ran a considerable distance towards it before the animal was hit.

Infantry escorts were generally provided for the artillery, and were employed in executing long-range firing. They ascertained the range from the artillery, and then allowed for their own distance from the guns and for the distances of their target from the artillery target. Special experiments were made to ascertain whether the infantry should use the range as given by the artillery range-finder or as given by the gun sights; it was found that the latter was the correct information to ask for.

In many cases the targets were too plainly seen by the attackers, but it was frequently noticed *that the result of a rapidly executed attack was to make the fire go high*. This points to the necessity of using a lower sighting than that required for the range when the men are fatigued, in order to counteract the effect of the greater amount of foresight

they then use; this lowering of the sight also admits of ricochet effects being obtained. It was also noted that for night-firing much less elevation is required for a given range than by day, on account of the excess of foresight used arising from the difficulty of seeing it. From these considerations we may gather that *in the majority of cases in war, especially after very prolonged firing, great care should be taken in the choice of the backsight elevation, which should be taken at less than that adjudged correct for the range.*

It was frequently noted that the advancing firing-line was preceded by a line of scouts,* but sometimes the scouts, on discovering the enemy, opened an individual fire until reinforced. This was considered a wrong procedure, as it could do no good, and may cause the destruction of the scouts. If the scouts lie down, the troops in rear can, owing to the rise of the trajectory, safely fire over them in war time, if the sights are fairly well adjusted to the range.

Complaints were often made that cover was not sufficiently made use of, and that companies were often halted to fire in open places, instead of being either hurried across them as a whole, or the men sent across in driblets. Troops could often have gained ground without being seen by making use of ravines or depressions leading to the front, but did not do so. Senior officers should always try and survey the ground over which their troops have to advance from some commanding position, so as to note the lie of the ground and the cover it gives. There was also too much skyline exposure, and too great a

* Had we adopted in South Africa this excellent procedure, which has been advocated on the continent of Europe for the last twelve years at least, it would have saved many brave lives.

tendency to hurry men over bad ground, which only caused them to become scattered, and so bring about the loss of all control over them for the time being.

An advance by the alternate rushes of companies was found to have the effect of masking the fire of the companies left behind. There was also a tendency on the part of many section leaders to advance without having first decided what point to make for, and how best to reach that point without masking the fire of other sections, or unnecessarily exposing their men. Troops were sometimes called on to charge a position before having collected in sufficient strength to do so successfully.

There was frequently a considerable want of initiative among the company officers and non-commissioned officers, but this was largely due to some commanding officers placing themselves in the firing-line and trying to regulate everything themselves. Commanding officers ought never to interfere with companies after they have been sent forward, but should remain with their reserves.

It was sometimes noticed that the firing-line of an advance was ordered to open fire at long ranges by the battalion commander. Consequently, it was pointed out that *it is the duty of the company leaders to decide when fire should be opened and the nature of it, and that under no consideration should a firing-line fire at long ranges, as its duty is to push forward without delay to effective ranges.* It should be remembered that, in action, every man in the firing-line will want every round he can carry, because his ammunition cannot be readily replaced, while specially selected units, taken from the troops in rear, can be used for long-range firing, whenever such a fire is considered necessary, since they can be supplied with ammunition without difficulty.

Nearly all the reports of the field-firing of large units point out the danger connected with moving large bodies of troops, firing ball ammunition, across broken and uneven ground that hides the different parts of the force from each other. The danger of combining together flank and frontal attacks was overcome by making one or the other fire blank ammunition. When the flank attack had to make a long march out of sight of the rest of the force, there were frequent failures in securing the timely and simultaneous co-operation of all the parts of the force. And in this connection the need for greater care in making explicit preliminary explanations, as to what the commander of the force wanted to be done by each portion of the troops, was frequently pointed out. A want of initiative among brigade and battalion commanders in the carrying out of the exercises of large units was noted, and delays were often occurring for want of definite orders.

The late Major-General Sir E. Ellis, writing on the attack manœuvres of 1899, in which a division was engaged, stated that "the main lesson to be learnt was the concentration and deployment under cover, of a division for attack on a position; the difficulty of combining a flank attack with a frontal attack on rough, hilly ground; the leading of units, companies, and sections in broken ground; the delays which must occur in working any large bodies of troops; and the effect of the fire of a containing line. Though recognizing the value of field-firing in large bodies for commanding officers and brigadiers, as showing them the necessity of working in unison with other troops, I am thoroughly of opinion that the company and section commanders and rank and file learn more in field-firing with small bodies of not more than two battalions. The reason is, that when a flank attack with ball is carried out in

combination with the frontal attack of a long line, the inevitable tendency is for the outer flanks to get too much round, thus rendering accidents very liable by one horn firing into the other, or bullets glancing off in rocky hills. The consequence is that each corps is inclined to wait on the one next to it, and the proceedings are apt to get 'sticky.' In smaller bodies, the control of the officer conducting the field-firing is more complete, every one sees what is going on, and there is more 'go' about the attack. I may say that the above views are strongly held by many commanding, wing, and company officers, and I have been informed more than once that the rank and file themselves do not think they learn much from larger field-firing days. All field-firing must be more or less unnatural; there is not the controlling influence of flying bullets from the front, which regulates the advance more or less; so a controlling influence, foreign to reality, has to be supplied by the officer directing the firing." Lieut.-General Sir A. P. Palmer, among his other remarks on these manœuvres, pointed out the difficulty of employing scouts freely, both to get in touch with the enemy and to select good fire positions for the advance, whenever ball cartridge is being used. During the manœuvres on the following day, a series of mishaps and misunderstandings occurred, and General Palmer's just comment of them was that they "only prove that it is necessary to sometimes practise a combined action of a comparatively large force at the field-firing practice."

The unreality connected with field-firing is largely caused by the necessity for ensuring the safety of life and property, and the desire to let every man present have an opportunity of firing away the rounds allotted to him for the day. But undoubtedly the chief defect of all our field-firing, as at present carried out, is the very small allowance

of ammunition given to each man. The expenditure of rarely more than ten to twenty rounds per man by the firing-line gives a most false impression as to the amount and intensity of fire that will be required to overcome that of a well-armed and trained enemy; the soldier is not taught what quantity of ammunition he may be expected to expend in attacking an entrenched force; the fire-unit commanders of the various grades are not impressed with the necessity of considering the quantity and rate of fire that may be required to attain certain results in the various situations in which they may find themselves during an engagement; and as only one or two rounds can be fired at each halt, the reality of the exercise must be lost. Similar remarks apply to the artillery, whose positions are usually chosen more for safety than for fire-effect, and who are rarely allowed to fire more shell than is barely sufficient for ranging purposes. Consequently, the troops in general are not unmistakably made to become acquainted with the quantity of artillery fire necessary to prepare the way for their attack; or with the positions that artillery would often have to take up on service to support the infantry advance. And as cavalry cannot charge, they are almost invariably called upon to open carbine fire under conditions quite unsuited to their dismounted action. It is not possible to employ cavalry in a realistic manner in combination with an infantry attack, because their dismounted attack can rarely, if ever, be appropriate under such conditions.*

These special defects were pointed out in 1895 by Brigadier-General M. Gossett, as a reason for abolishing all field-firing for units over the strength of a battalion. But even if this was done, there would be no more

* The influence of these defects is easily discerned in the opening fights of the Boer War.

ammunition forthcoming for the field-firing of battalions working alone. Hence General Gossett brought a very real defect to notice, which is all the more real when taken in connection with the considerable difficulty that exists of obtaining suitable ground near the stations of the troops, and the still greater difficulty of getting sufficient money from Government to make the field-firing exercises as realistic as possible. To be really satisfactory, field-firing requires money, ground, and troops. Movements cannot be carried out at any distance from cantonments without extra expense, and if no money is available for compensation of injuries to property, the choice of ground is woefully restricted. The use of ground for one day's field-firing a year generally entails on the civil administration of an Indian district the responsibility of having to forbid the villagers from going to their fields, and sometimes, even, of having to clear every one out of villages for the day, and afterwards to settle any claims for damages done to the crops by the troops. But it is impossible to learn the handling of strong forces from the experience gained from the employment of very weak forces in ordinary manœuvres. Consequently, General Gossett proposed that field-firing with ball ammunition should be restricted to battalion and smaller units, and that the field exercises of larger forces than that of a single battalion should only be conducted with blank ammunition, in order to avoid the unreal conditions introduced by considerations of safety. If this was done, suitable ground for both the field-firing of battalions and the field exercises of larger forces could be more easily and cheaply obtained, while the valuable lessons to be derived from the handling of large forces would not be lost. In 1891, however, a somewhat novel method was tried. The field exercises of a division were first carried

out with blank ammunition, the three arms mutually co-operating as they would in the field. Then the next day the cavalry repeated what it did with ball ammunition; on the following day the artillery repeated its work with shell; while on the next day the infantry repeated its work with ball ammunition. And as fresh targets were put up each day, the fire effect of each arm was tested separately.

The different characteristics of the field-firing of small and large units are but a reflection of the important difference that has long been insisted on in Germany between what is called "detachment fighting" and "the battle." In detachment warfare many things are admissible, including a wide scope of taking the initiative, that would be most injurious to the orderly progress of a decisive battle. The two things are quite different, and this fact, though strongly insisted on by continental countries, has not met with any adequate recognition among English military writers.

NOTE.—Since the above was written, the reports on the musketry training of the troops in India during 1900-01 and 1901-02 have been published. As they show how fully musketry and tactics are combined in India—a principle which is embodied in the new *British Musketry Regulations, 1903*—the main portions of each are given below.

REPORT FOR 1900-1901.

With reference to Adjutant-General's Circular Memorandum No. 458-E., dated 23rd May, 1900, and War Office No. 1041, India 429, dated 17th July, 1900, circulated under Adjutant-General's No. 999-E., dated 20th August, 1900, authorizing certain infantry regiments to be selected to carry out a special course of practical musketry, instead of that laid down in the British and Native Army Musketry Regulations, the Commander-in-Chief desires to bring to

notice the following points which he has gathered from the reports on this course and forwarding remarks from General Officers Commanding and Lieutenant-Generals Commanding and from his own observations during the past year, and trusts that they may be of service to all ranks, and of assistance to any regiments which may in future be ordered to carry out a practical course of training.

2. Special care had to be taken in selecting regiments for this course, as it is evident that, unless a regiment can shoot well on the range, it would be a waste of time and ammunition permitting it to carry out a series of individual practical exercises and collective practices combined with a tactical idea, and His Excellency is satisfied that these considerations received due attention. There is no doubt that the course was most popular, and that all ranks took the greatest interest in it, possibly because it was a novelty and it was found an improvement on the monotony of the ordinary range course. But, while desiring to give officers a free hand as much as possible and free them from the drudgery of range practice and while impressing on them that the hillside and open country, as far from cantonments as possible, and not the parade-ground and rifle-range, are the proper places on which to carry out their training for service, and that musketry and tactics cannot be separated, His Excellency must remind officers that, as no house can be securely built without solid foundations, so no practical training can reach an efficient standard unless all ranks are thoroughly grounded and periodically kept up to the mark in barrack-square drill and range practice. Adjutants and drill-instructors may find it hard to get men through their recruit's course, but time spent on properly administered preliminary drill and repetition of range practices till the required standard of shooting is attained will be

well compensated for by the higher state of efficiency in which recruits will join the ranks.

3. The present Musketry Regulations for the Native Army are based on this idea. Every officer and man is required to fire a certain number of rounds in range-practice, but only sufficient to ensure that he keeps himself up to a certain standard. "Such as cannot reach the somewhat moderate standard asked from them have to repeat till they can do so.

4. Attention was last year called to the value of long-range firing, and of moving and disappearing target practice. Ammunition for these practices has, in the Native Army, to come from that allotted to field practices, but probably next year moving and disappearing practices will be included in Table B, as every soldier should be exercised in them. Long-range firing, on the other hand, must be carried out with discrimination, or the ammunition spent on it will be wasted. It is not all men who are gifted with the eyesight to shoot at a smallish object at a range of over a mile, and before men are told off for such a practice, they must have proved that they are thoroughly good shots at medium ranges. Possibly any man can help to "pump lead" on to a piece of ground or a mass of troops if he can see the distance, but not much preliminary practice is required for such a proceeding.

5. It is noticed that very few ranges are yet provided with suitable cover-trenches, sangars, etc., to fire from, in spite of the orders on the subject. Very few men know how to fire from cover and rests, even when natural or artificial means exist. Men get themselves into impossible positions, and often do not rest their rifles or arms, and expose themselves most unnecessarily. Men are seen wandering about, exposed to fire, looking for stones, etc.,

to build cover with, and then lying down behind four inches of earth or clods, or something that would not keep out a bullet, and imagining that they are under cover. Every range is to be provided with various specimens of cover, made by the troops at their military training. His Excellency has under consideration the advisability of half the rounds at each distance being fired in the native army with the use of rests, to teach men how to use rests and cover, and to realize what an effect "jump" has on the flight of the bullet, and how "jump" is varied by the way the rifle is rested on various materials, such as hard rock, earth, etc.

6. Last year His Excellency took up the question of field-firing, and recommended that, as a rule, except under special circumstances, this should only be carried out by small units. Troops must nowadays work on a very broad front, and unless unlimited ground is available, the tactics of a brigade, for instance, must be sacrificed to considerations of safety of the populace, and troops get a wrong idea of tactics and the working of the three arms. It was also pointed out that, as a rule, schemes for field-firing only consist of an attack on a position, and that other tactical problems should sometimes be tried, such as a rear-guard action; a retirement, the attack on a position being supposed to have failed; a flank attack; defence of the perimeter of a camp; escort to a convoy; forcing a pass; withdrawal of a foraging party, etc.

It seems hardly necessary to remind Commanding Officers that field-firing—that is, the combination of musketry and a tactical idea—should be worked into, and form part of, the annual squadron or company training; and that as many of these exercises should be carried out as ammunition will allow of.

7. An important branch of our training, which His

Excellency fears does not receive proper attention, is judging distance. The regulations only order officers, non-commissioned officers, intelligent men, and recruits to regularly carry out this instruction. Even if carefully and intelligently carried out, this instruction falls very short of what is required ; but until some more practical method is devised, this would be better than nothing, if real interest was taken in it. The most practical way of learning to judge distance is to fire at objects at unknown distances, but the allowance of ammunition does not permit of much of such practice. Nowadays, when we have to fight in such extended formations, men cannot always depend on an officer or non-commissioned officer for the range, and the regulations laid down for practising the men should be more frequently and regularly carried out. It not only requires practice and skill to judge distance, but even to find an object on a distant hill, and the field-glasses with which officers provide themselves are often not powerful enough.

8. Another point connected with judging distance is range-taking. Regimental signallers are seen at work nearly every day, as it is recognized that nothing but constant practice will keep them up to the mark. Range-taking does not receive the same attention, and yet it is well known that to take ranges with any degree of accuracy is a most difficult business, and that expertness can only be attained by perpetual practice. It is, moreover, not good enough to be able only to take a range standing up in the open. Range-takers must be able to work from behind cover, exposing themselves as little as possible, as well as any other men.

9. A few commanding officers seem to be under the impression that, as in the present day men have to fight in

very extended formations, fire control and discipline must be a thing of the past. This is very far from being the case. We have hitherto tried to train our fire-unit commanders to control the fire of their men. We must now go a step further, and train our men to control their own fire, so that when they are too extended to be under the control of non-commissioned officers, they will deliver their fire steadily and effectually without wasting their ammunition. Officers and all ranks can materially help each other much more than is generally done. Information about objectives and the range can be passed down the line or communicated to fresh bodies coming up. Officers and non-commissioned officers cannot in action expose themselves by wandering about to see if sights are correctly set and rifles laid on the objective, but word can be passed along ; and if men are thoroughly trained in peace time, there will be less necessity for their being so much looked after in action. In some regiments men work in pairs, and "coach" and assist each other, a sensible arrangement, in extended order, when men cannot rely on help from non-commissioned officers. It is now generally recognized that volleys are unsuitable and impossible except for ranging purposes, and that in extended order controlled independent fire must be employed, but in some regiments it is noticed that volleys are still usually used.

10. The definition of "fire tactics" given in the Field Artillery Drill is as follows: "The selection and change of positions and of targets, and the concentration and distribution of fire in accordance with the progress of the fight." In the same way as artillery can concentrate or distribute their fire on various objectives according to the progress of the fight, so can infantry commanders render the fire of their battalions far more effective by preventing

it from being wasted on objectives it is not important to fire at, and by having it concentrated on the particular troops whose annihilation is necessary. Major Mayne, in his *Infantry Fire Tactics*, quotes the example of the third battle of Plevna, when the Russians defeated the fourth counter-attack of the Turks by firing, not on the Turkish firing-line, but on their reserves in rear.

In this case it must have required a good deal of consideration on the part of the Russian commanders as to how they could best distribute their fire over the front of the attackers' reserves, and discipline on the part of the men, which made them fire at the reserves as ordered, instead of at the enemy's firing-line, from whose fire they were probably suffering.

If left to themselves, sections or individuals will fire at the most conspicuous object in front of them, which in the case quoted would have been the enemy's firing-line, instead of what is tactically the most important objective to be fired at.

This means a waste of ammunition, and it might be better not to fire at all than not to fire on what is at the moment the most important object.

His Excellency has noticed that supports and reserves and second and third lines do not, as a rule, realize how effectively they can often assist in the firing-line by taking advantage of undulating ground and firing over the heads of the troops in front. In the attack, as each successive wave passes over ground favourable for such action, a man or two should be dropped to give the next line any information it can as to objectives, elevation, etc. In taking up a defensive position, it is probably often possible for supports and reserves, etc., to be so disposed as to be able to bring several tiers of fire to bear on the attackers.

In frontier warfare the ground generally lends itself to units mutually supporting each other, especially in a retirement or a rear-guard action, on which occasions the tribesmen invariably seize the opportunity of carrying out tactics at which they are such adepts, but in these retirements it may happen that it is impossible for units to cover each other's withdrawal without affording a target to the enemy. The Commander-in-Chief, on such occasions, would like to see retiring parties break up, and individually find their way to the next defensible position, each man looking out for himself and availing himself of the best cover *en route*. The party should, however, only break up by command of the senior non-commissioned officers or old soldiers present.

11. A point which has hitherto not received much attention, and which is of great importance, is that the actual "distance" of the objective from the firing-line is not necessarily the "range;" that is, that the number of yards taken off a map or given by a range-finder is not always the number of yards to which the sights are to be set.

The .303 Lee-Enfield rifle has been experimentally sighted under the following conditions, which may be considered normal :—

1. Firing point and objective on the same level.
2. A barometric pressure of 30" (sea-level).
3. A temperature of 60° Fahrenheit.
4. Still air.

When any of these conditions is abnormal, the sighting for any range, as marked on the backsight, requires correction.

When any or all of these conditions vary in excess, the fact that the distance is accurately known will be quite

useless in obtaining satisfactory results unless the principles of modifying the normal sighting are understood.

[Here follows the substance of the information given in Appendix II., together with the diagram.]

The value of long-range fire (at suitably large objectives) once admitted, the importance of officers acquainting themselves with the principles of applying the requisite modification for sighting under all conditions is apparent.

The backsight of the rifle is not marked for sighting to divisions more minute than 50 yards without the use of verniers which are not of practical use in the field. When corrections according to the foregoing rules have been made with as much accuracy as time and circumstances permit, the sighting should be adjusted as nearly as possible, bearing in mind that undersighting is preferable to oversighting.

It should be understood that the foregoing rules cannot be relied on to give the accuracy expected in target-shooting on the range; careful trial has, however, shown that they may be relied on (always assuming that objectives proper for long-range firing, such as groups of men, horses, or guns are selected) to prevent the waste of ammunition which must inevitably occur when the important factors just discussed are entirely ignored.

Pocket aneroids with attached thermometers will be found of great use to officers. They are, however, expensive. Aneroids are delicate instruments, and should frequently be tested by comparison with a standard barometer.

As regards the effect of wind blowing from various directions on the normal sighting, it must be admitted that no very practical rules can be given as aids.

Experience gained by constant range-practice is the safest guide.

12. Expending ammunition in tactical schemes affords all ranks the only opportunities they have of watching the effect of their fire—a far more difficult and important subject than is generally realized.

13. The reports on the special course show many carefully thought out schemes, and that they were, as a rule, well carried out. In some regiments, principally British regiments, a regimental scheme was drawn up and all companies carried out the same. In some cases this may have been unavoidable owing to the paucity of experienced officers, but in regiments where company and double company officers were allowed a free hand and allowed to draw up their own schemes, they took far more interest in the course, and derived benefit themselves by having the responsibility of the training thrown on them. The Commander-in-Chief hopes that in future the officer commanding each squadron, company, or double company, will be allowed to draw up his own scheme for the expenditure of the rounds at his disposal, subject, of course, to the approval of the commanding officer.

14. In many reports remarks are made on the small percentage of hits obtained, and the cause is said to be due to the practice being carried out under service conditions. This, of course, is as it should be, but on service that percentage would probably be still further reduced by the enemy, instead of being lifeless dummies, being armed men returning the fire and keeping under cover. His Excellency is sure that the percentage might be raised by individual marksmanship being improved, by accurate estimation of the "range," by intelligent use of cover and rests, and by *carefully watching the effect of the fire*. Men under cover in a trench, sheltered from the wind, and with no flags and streamers to show them the direction and strength of the

wind, are apt to forget that the flight of the bullet is affected by conditions which they may not feel. Many officers, no doubt with the best intentions, are anxious to be allowed to do a practical course, but they must remember that, unless the men are well trained to individual proficiency on the range, the chances are that their ammunition will be wasted when they have a very small object to aim at, and cannot tell where their shots are going.

15. In carrying out tactical schemes with ball ammunition, as in all operations and exercises, the object in view should be most carefully explained to all ranks and all details attended to beforehand. All realism is taken away when, as sometimes happens, men do not understand the scheme, or the practice has to be stopped for some reason that might have been avoided, such as the omission to sound the "fire" or see that the markers are under cover.

16. Other points noticed by the Commander-in-Chief are:—

That not enough practices were carried out at longer ranges than 1000 yards. In the native army this was probably due to the Martini-Henry rifles not being, as a rule, effective at long ranges. Martini-Henry rifles vary considerably, but it is astonishing what good results have been got sometimes at 1300 or 1400 yards.

It is remarked that there is often too much crowding in the trenches.

Unnecessary delay in opening fire, due probably to officers and non-commissioned officers not being able to make up their minds what they have to do.

Signalling defective between units.

Men unnecessarily exposing themselves getting into or returning from a position.

Mekometers used at too close a range.

Want of co-operation between bodies of troops.

Units working very stiffly, being afraid of accidents. This will improve as the novelty of working so much with ball ammunition wears off.

Men failing to creep up into the firing-line to take the place of casualties.

Failure to pass orders along the extended front.

On the other hand, some commanding officers were able to notice an improvement in many respects as the course proceeded.

For instance, one officer says that after a bit men in very extended order, beyond the control of non-commissioned officers, learnt to find their own cover, their own target, adjust their sights, see their front was clear, and then hit their target—in fact, carry out the initial orders given by their officers on their own responsibility, thus showing the value of careful preliminary instruction in fire-discipline.

Again, the value of cover was realized by men eventually learning to make such use of it that officers watching with field-glasses were often unable to make out where the fire was coming from.

There is a certain amount of ammunition at the disposal of officers commanding regiments, and a considerable proportion of the practice rounds is told off for field practices. Some regiments had a considerable amount unexpended last year, so some exercises can be carried out with this.

19. In a recent circular attention was drawn to the necessity of developing fire-tactics up to the extreme range of the carbine, but at the same time of not making musketry an excuse for neglecting drill and manœuvre and skill at arms; and also sounding a warning note against the cry which is periodically raised that "the days of cavalry are over."

The necessity of moving in very widely extended formations is fully recognized by infantry, and cavalry also must move at larger intervals, when under fire, both when mounted and dismounted, working chiefly by pre-arranged signals; led horses should be kept as near as possible to the dismounted men when cover is available.

20. Cavalry schemes must necessarily be different to those of infantry, and as a help to cavalry officers Sir Power Palmer offers the following suggestions as to circumstances under which schemes for cavalry fire-tactics might be based:—

- (a) *A cavalry outpost line. Action of a piquet holding its ground when attacked.*—Now that cavalry are armed with a long-ranging weapon, which enables a very small body of men to defend a large front by magazine fire, the action of piquets will probably be more effective, especially at long ranges, by using their carbines than by mounting (Cavalry Drill, p. 335) and attacking an advancing enemy with the *arme blanche*, which is more the duty of large formed bodies than of piquets. The magazine arm will also probably tend towards the holding of the line of the piquets rather than to the retirement of the piquets on the supports line. By an intelligent use of magazine fire an attacking force can be deceived into thinking that a piquet is quite treble the strength that it really is. We were often so deceived in South Africa (especially in Natal).
- (b) Owing to their mobility, cavalry can transfer themselves rapidly from place to place, giving the enemy the impression that several positions are held, and can also reinforce isolated detachments

of infantry as well as cavalry, which may run the risk of being overwhelmed.

- (c) As armies must fight on a very extended front, gaps in the general front are not unlikely to occur, and to fill these gaps cavalry, if kept in reserve or brought up from a flank, might prove most serviceable, as owing to the extended formation that our infantry must adopt, the enemy may attempt to overpower them in force at various points, or turn their flanks: this would give alert cavalry opportunities for counteracting such counter-strokes.
- (d) Flanking and enfilade fire are most discomfiting to an enemy. Cavalry can render valuable service by rapidly manœuvring to gain an enemy's flank and pouring in an accurate and deadly fire, and this method of assisting their side is applicable to small as well as to large bodies. Really alert and well-trained cavalry should be much more efficient than mounted infantry, as they can negotiate difficult country better, being better riders. Example of the latter: American cavalry in pursuit of Southerners, making wide turning movements, repeatedly dismounting on the flank and intercepting the retreat, and finally bringing about the surrender of the whole of Lee's army at Appomattox, on the 9th of April, 1865. Also in the late Cuban War, the American dismounted cavalry not only drove the Cubans out of their entrenchments, but held these entrenchments against repeated attacks of the Cubans at Santiago.
- (e) In the course of an engagement, some unoccupied place, a village, or hill, may assume a tactical

importance. It may be seized by dismounted cavalry, and held by fire until the arrival of infantry secures the position.

- (f) Preventing the arrival of reinforcements, *e.g.*, French holding off the Boers trying to come to the assistance of Cronje at Paardeburg.
- (g) An inferior force of cavalry might hold a superior one in check, if the ground lent itself to the action, by dismounting and meeting the stronger force by fire.
- (h) In a retirement, dismounted cavalry, with magazine arms and smokeless powder, should, as when on piquet duty, be able to deceive a strong pursuing force, and hold it in check with long-range fire, and thus give time to our rear-guard to get away or to occupy another position; and, having their horses at hand on which to make good their own retreat, be able to hold on longer than infantry could probably do.
- (i) A reconnoitring party can often by dismounted action brush aside opposition, or force a defile which may block its advance, and may also check or defeat the enemy's reconnoiters by fire rather more effectively than by mounted action, if a good fire-position is selected.
- (j) A retreating enemy may get beyond the range of our infantry, or get into ground unsuitable for the mounted action of cavalry, but the cavalry of the pursuing force can still inflict continued loss on him by long-range fire-action, especially if it can enfilade him [see (d), above].
- (k) A few dismounted men can cover the retirement of retreating cavalry through a defile.

(d) Cavalry by fire-action can take part in the defence of the perimeter of a camp or bivouac at night.

21. Although cavalry dismounted action is mainly defensive as far as actual fighting is concerned, yet if pushed forward in sufficient strength it can, by seizing a favourable position, often compel the enemy to deploy and lose time, thus assisting our other arms to manœuvre or make a turning movement. .

22. The above are only suggestions of some of the opportunities that alert cavalry leaders should seize on service ; and commanding officers and squadron commanders, when preparing their commands for the field, must strive to neglect no point that will tend to keep cavalry up to date in these days of arms of precision.

Opportunities for shock tactics against a broken or retreating enemy, or for some supreme effort, will occur in every campaign, and opportunities for surprising the enemy must never be neglected ; the above notes, however, are issued in order that instruction may enable us to meet him at the greatest advantage to ourselves by the full use of rifle-fire when favourable opportunities offer.

The word " opportunity " frequently occurs in the above notes, not inappropriately, as it must never be forgotten that cavalry is the arm of opportunity. An opportunity lost may be a reputation ruined.

REPORT FOR 1901-1902.

The following remarks by His Excellency the Commander-in-Chief on the musketry training of the troops in India for 1901-1902, are published for information :—

The special features of the musketry training of the year have been a still further advance in the execution of

musketry practices in a practical manner and endeavours to raise the standard of individual shooting, and it is now fully realized by all ranks of cavalry and infantry that to be efficient on service a really practical training in peace is required, under service conditions, as far as they can be simulated, that is, that military training must be combined with practices at objects and at ranges likely to be met with in the field. The increased attention given to musketry is gradually fulfilling its object, and a great improvement both on and off the range is noticeable.

2. In spite, however, of the interest taken and the improvement that has resulted, the commander-in-chief fears that we are still very far off the standard of efficiency that should be reached before we can take the field with the confident knowledge that no enemy we may encounter can surpass us in shooting, or with the feeling that our musketry training is as perfect as it should be.

3. Not much faith is placed in paper results. It may be remembered that the publication of figures of merit in India was stopped two years ago, as it was considered that as long as corps found their efficiency judged by their position on the list, they would resort to means to make a high figure at the expense of practical work, but, at the same time, looking at the standard attained by various regiments in range practice, his excellency cannot help thinking they ought to be much higher, and, moreover, allowing for the various conditions under which regiments fire in different places, he cannot help feeling that there is too much difference between the various standards attained.

5. The course that was fired last year by British troops was different to any previous one. The independent practices for classification included, besides the ordinary range practices, snap-shooting at fixed and disappearing

targets. A few regiments had no difficulty about these practices, but most regiments found the course very difficult in consequence of them. This suggests that the system and standard of instruction vary in different regiments.

A few battalions made over 140, but most vary between 140 and 120, and one battalion made only 107 with 20 per cent. of third-class shots.* The commander-in-chief does not see how we can expect good shooting under service conditions from regiments which cannot make better shooting than this on the range. A few brilliant shots who win important prizes for their battalion are, no doubt, very useful at times, but the general efficiency of a regiment is increased more by the careful training and improvement of indifferent and bad shots than by the encouragement of a few individual marksmen. No regiment should have more than 4 or 5 per cent. of third-class shots under the easy conditions that range practice is executed.

8. In some regiments there are too many non-exercised men. Considering that a soldier who can't shoot is useless on service, and how quickly men get out of practice, every effort must be made to train every man, no matter how he is employed.

9. The British musketry course* contains some good practices, but in one way the regulations appear unsatisfactory. We don't know the real state of efficiency at the end of the year. Men are put through it and classified on their first shoot. Those who do badly receive further training, and in most cases improve greatly, but they are still classified by the first attempt in the year. In the further training of bad shots, it would be a great inducement to instructors and men if any improvement in points was allowed to be credited to the men and their companies.

* Previous to 1903.

In the native army, every man has to reach a certain standard, and he and his company are credited with his best performance at each distance. This point will be brought to the notice of the War Office.

11. *Practical Musketry*.—In some districts it is not easy to get ground for tactical schemes with ball ammunition, and in a thickly populated and highly cultivated district a manœuvring-ground is required which will be available for the use of the troops at any time of the year without the necessity of asking the permission of the civil authorities to use it, and making it necessary to clear the inhabitants and cattle off it during practice, and it is hoped that such will in time be procured. There is no doubt, however, that if officers are keen to train their men, they don't allow difficulties of ground to stand in their way, and some means will be found. For instance, the general officer commanding presidency district, arranged for the regiments at Fort William to fire at floating targets on the Hugli from the parapets of Fort Chingree Khal. At Rangoon some excellent practice was carried out from one of the forts at a floating target, which afforded valuable instruction in many details to all ranks.

12. In former years efforts used to be made to obtain a very high figure of merit at field-firing, which was generally managed by covering a position with a large amount of canvas, the screens being sometimes so arranged that one bullet would go through two or three of them, and as most of the ammunition was usually expended at short ranges, it is wonderful that higher percentages were not always made. There is a story of one case where over 100 per cent. was made, but the company was a particularly good shooting one, and the regiment had plenty of money in its lead and cartridge-case fund, and could afford plenty

of canvas! However, this is all changed. Company officers are more alive to their responsibilities than formerly, and now that they have, as a rule, a free hand, they take great pains in drawing up schemes suited to the force available, and generally carry them out carefully. The targets used are, as a rule, suitable, but keeping them up is a heavy expense, as the lead and cartridge-case funds lose the value of the lead fired off the range. The new system under which Government grants a yearly sum for the provision of targets is a great improvement on the old method of obtaining screens by having old ordnance and commissariat material handed over for the purpose, and in course of time each district and station will accumulate targets which will be available to the troops as they require them. There are a lot of very suitable targets in use, but it may be as well to mention two which are not much known. One is of the size and outline of a man's head, and can be made of basket-work for a very small sum, and is very light to carry about. Lightly propped up with a stick, it usually falls when hit, and it may be hit many times before it is done for. The other target is of sun-dried bricks, used by the 2nd Battalion 1st Gurkhas, and invented by Lieutenant-Colonel Robinson. The bricks can be built up to represent a head, or head and shoulders, and cost very little. If hit they may fall, or they may show a hit by the dust, and holes are easily patched up with a little mud. It is sometimes hard to see the targets. An enemy might show the position by moving, but dummy targets cannot do so. A piece of paper tied on, which will flutter in the wind, answers the purpose (also Colonel Robinson's idea). We don't want enormous objectives, but at the same time it is a mistake to have them too small, as the men don't know what they are firing at, and the results

of fire cannot be tested. The men are under instruction, and must have objectives they can see. It is, of course, good practice to make them look for objectives, but firing at targets that are concealed, or nearly so, will probably mean a waste of ammunition.

13. Some reports state that we don't want a high percentage at practical musketry. This is quite true if it is made at the expense of practical work, but the percentages made are, as a rule, very small, and officers are often heard to comfort themselves by remarking that as long as a practice is well carried out and the objectives are small, and placed as they would be on service, it doesn't matter about the hits. This is all very well, and we don't want fictitious figures, but it must be remembered that the end and object of all such practices is to teach the men to *hit*. "Fire-effect is everything, and the rest nothing." If in peace time we can only make 5 or 6 per cent. of hits, what shall we be able to make on service when the objectives, instead of being lifeless dummies, are men, moving about and upsetting our nerves by showering bullets upon us? Having realized that all schemes must be practically carried out, it is hoped endeavours will be made to get more hits; but until individual marksmanship, in the case of British troops, and skill in estimating distance are improved, his excellency does not see how we can expect much off the range.

14. Schemes are generally well thought out and carried out, but not always. Cases are known of a company being marched up in close order in full view of the targets, without the ground being reconnoitred by scouts or ranges taken, the men there strolling about on the top of rising ground, volley-firing continued till the ammunition was expended, and no attempt made to watch the effect of the

fire, correct the range, or stop useless fire. It is argued that on service that sort of thing would not be done, and that a bullet or two would rectify matters. Possibly it would, but it would make the men crowd behind the nearest cover, and we don't want to buy our experience at the expense of valuable lives. A case is known of a scheme, comprising an attack, being carried out first and then the men being marched back, and long-range fire practised over exactly the same ground, instead of the long-range fire being done first, to cover the subsequent attack.

15. In many regiments formations are still much too rigid, and native officers, and non-commissioned officers particularly, don't like any initiative on the part of the men, but try to keep them strictly under their own control. Many men, even old soldiers, want individual instruction in field work. They are too often expected to know or find out for themselves how to work as individual members of a squad. Each man requires to be taken over ground by an instructor and told how to act, how to get over it without exposing himself, how to utilize cover, to get into position to fire, how to act in cases of emergency when there is no section commander at hand to dry-nurse him. Widely extended formations have increased the necessity for independent action on the part of the soldier, and he cannot always depend on having some one at hand to tell him where to go and what to do.

16. The tendency to carry out a stereotyped form of attack-practice has much diminished, but it is astonishing how many schemes do still take the form of an attack. Many defensive schemes could be carried out on ground which is not extensive enough for troops to attack over.

17. The performance of field practices with ball by small units has been proved to be far more instructive to

junior officers, non-commissioned officers and men, than brigade field-firing. There has been a considerable amount of surplus ammunition at the disposal of lieutenant-generals commanding which has enabled corps to make their training more thorough. Endeavours have been made to spread the execution of field practices over a considerable part of the year, but, as a rule, difficulties of getting the ground frequently cleared and want of transport necessitate most of the practices being done at one time of the year. Long and extreme range shooting has been carried out at almost every station, but the want of field-glasses in many cases makes the practice hardly worth the expenditure of ammunition.

18. His Excellency is well aware that officers in framing their schemes are tied down by the limitation of ground, but, good as most schemes are, he thinks that in many ways they might be more instructive, and more incidents liable to occur on service might be introduced or imagined. Many schemes once commenced are pushed through without a pause. It does not seem to occur to superintending officers that in an attack, for instance, a point may be reached when the men simply cannot push on, and where they may have to wait for hours until night, or until some development in another part of the field enables them to take the offensive again. They may be able to return the enemy's fire, but possibly may have to lie behind what cover there is, or in the open, under a heavy fire, without replying. In a case like this non-commissioned officers should be told off as umpires to order a line to halt for a fixed period till it is tactically enabled to resume its advance.

19. Sufficient use is rarely made of marksmen. They and bad shots are mixed up together, and fire indiscriminately. There are many occasions where marksmen

might be employed with advantage, and where it would be useless to allow bad shots to fire. For instance, men posted on the flank of an enemy's probable line of advance to annoy him, men placed in rifle-pits to pick off the enemy's sharpshooters, a few men detailed to keep reconnoiters away without disclosing the position by heavy fire.

20. Extended formations are practised, but generally in a very mechanical way, and officers, especially native officers, seem afraid to let sections or groups get away from them. It should be remembered that fire is far more effective when converged from several widely separated groups than from groups all in one position, and officers should arrange for the necessary concentration of fire by signalling. With a long-ranging rifle gaps can be secured between various points occupied as long as they, or the ground in front of them, can be swept by fire. The advantage of an extended or circumferential position lies in the fact that, in addition to being able to concentrate one's fire on the enemy, the enemy is obliged to disperse his fire.* In practising a scheme of this sort, all ranks could appreciate the value of a long-ranging rifle, and also see how dangerous it is for a body of men to get concentrated in one place.

21. A good deal of snap-shooting is done, but generally on the range, and merely as a practice. This does not convey to any one the object and use of snap-shooting. In former days battles were decided with the bayonet. Nowadays one usually closes with one's enemy with rifle-fire and shoots him out of his position, and it is here that snap-shooting at short ranges comes in.† If a range is

* Not necessarily so, as the enemy can concentrate his fire on successive parts of the attacking line.

† The author considers that the value of snap-shooting is greatly

provided with plenty of cover there is no reason why snap-shooting should not be done on it, but each group or section should act as if part of a larger unit, and as if carrying out a regular scheme. It is of no use unless it can be done from behind cover, and the firer must offer as small a target as possible to his dummy adversary. Our men, and especially native soldiers, are too slow with their fire, and lose their chance of a shot. Men don't attend, but look about them, and want a section commander to tell them to fire. Infantry and dismounted men can really only protect themselves against an enemy lying under cover when men are capable of hitting a target no larger than a man's head.

22. In many cases no attempt is made to show men the effect of fire on troops in different formations at different ranges. For instance, it might be tried what effect fire at 900 or 1000 yards has on a line advancing at four paces' interval, on a column at 2000 yards, or on extended lines close behind one another, and on small bodies of cavalry or artillery. It is not sufficient to let the men know they made a certain percentage of hits. They should be marched along the line, and made to examine the targets and see the effect of the fire.

23. Scouts when sent out should be given a very clear idea of their duties.

24. Our movements when using ball ammunition, and even when using blank, are too stereotyped. Units do not act on their own initiative to rush forward. Rushes can be carried out by small bodies or individual men ; at

overrated here, as no enemy will ever be shot out of a position. He must have been sufficiently demoralized by the previous firing to admit of the bayonet assault being made. Snap-shooting during this advance will tend to keep the enemy demoralized and encourage the assailants.

present they are too long, and the cessation of fire is too marked. A rush under effective fire should not be so long that the enemy has time for aimed fire. Advances should be made by trickling, but if done too much with the regularity of drill they become dangerous, as if men get up regularly one after another, perhaps from both flanks in turn and in regular order, an enemy on the look-out would know who to expect to move next. All rushes, whether by individuals or groups, must be covered by fire. The men first in position should open fire at once, and the men behind should cover by fire the advance of men in front.

25. Another point is that we generally reinforce straight to the front, regardless of loss in doing so. Unless it can be done under cover, reinforcement of the front line from the rear can seldom be carried out. The most dangerous place is from 200 to 100 yards behind troops under heavy fire, and therefore if reinforcement cannot be effectually made to a flank, advantage must be taken of any slight lull in the enemy's fire, and the supports must come up by trickling, each man making use of any cover there is. Having the support wiped out would have a very serious actual and moral effect on the troops in front. "It is well known that 20 per cent. loss in twenty minutes has more effect on troops than 50 per cent. spread over the whole day."

26. In a retirement, men retiring will often walk straight on to troops in position in rear, and so mask their fire, instead of clearing their front.

27. Cover is gradually being more used and with better intelligence. In the native army the men are now taught the use of cover in their individual course, and fire more than half their rounds with the use of rests and cover. British troops require the same instruction. Men will get

behind cover, but they do not yet know how to use it to fire from. On one British range, His Excellency is informed, the ground was as smooth as a billiard-table, and to fire the practices of the course that required cover, barrack tables and benches were brought out to represent it. It was urged that it was no use digging trenches, etc., as the rain filled them up! As a matter of fact, nothing can be better, as each company must thus get instruction in throwing up cover every time it shoots these particular practices. Shooting and cover from beginning to end of an action are the main objects of all arms, and so in peace time the preparation of cover and practice from it should be combined.

28. There is still a tendency on the part of officers and non-commissioned officers, range-takers, etc., to behave as if they were bullet-proof. Sometimes for instructional purposes they have got to move about, but it is very important that they should learn to carry out their duties as they would have to do on service without exposing themselves.

Troops do not act, as a rule, as if they were under fire. Casualties are made, but not enough. Reinforcements are made, not because they are required, but with a view to get men in support up and let them fire, and the line gets overcrowded. Casualties are then made in a haphazard way, and very rarely an attempt is made to appreciate the effect—or simulate it—of the supposed enemy's fire, and to make casualties at times when the troops would be exposed to heavy losses.

29. One great drawback to all firing is the want of good glasses. All officers, of course, have them, as also a good many non-commissioned officers, who have bought them or been provided with them from regimental funds. It is,

however, very exasperating to see an officer or non-commissioned officer, supposed to be directing or controlling fire, with his glasses in their case, instead of attempting to use them for his own edification and the benefit of the men.

30. In the case of one very excellent regimental camp of instruction, in which the ground was most favourable for all sorts of practices, and the schemes were practical and all ranks keen, the proceedings were much spoilt by the men being required to do the training in field-service order. They would not use cover properly, or crawl or skirmish as they should have done, because their smartly pipe-clayed belts and pouches would have been spoilt. Men don't care what they do if they turn out in shirt-sleeves and an old pair of karki trousers, and carry the small amount of ammunition they get each day in their trousers' pockets and haversacks.

31. The passing of orders along an extended line, under cover (and also to the rear and front), is not easy, and requires practice.

32. The importance of mutual support by cross-fire during an advance or retirement and the value of oblique fire generally is not fully realized.

33. Last year attention was called to the necessity of correct appreciation of the relative importance of various objectives which may be visible at the same time. The Boers often directed their fire on the supports and reserves if these offered a better target than the firing-line. Supports were often seen to lie down or retire while the firing-line still came on, till it withered away for want of support. If there were no favourable targets, the Boers did not expose themselves to the enemy's fire, but relied on having sufficient time when the targets were good to annihilate the attack.

An officer was once heard to remark that this was only common sense! Tactics and fire-tactics are nothing but common sense, but why don't we go in for common sense more than we do?

34. Officers and non-commissioned officers are sometimes rather fond of firing themselves instead of attending to their own duties. It is to be hoped this practice will not increase when carbines take the place of revolvers. *Officers must remember that they carry fire-arms for defensive purposes only.* There may be occasions when an officer who is a good shot can fire to find the range, or pick off a "sniper;" but such occasions are rare.

35. Commanding officers always carefully explain the plan of operations to officers, and the latter explain them to the non-commissioned officers, but it is doubtful if the men always hear or understand them. To make operations instructive, every man must know all about them, and a short time spent in discussing the situation and how the operation is to be carried out will not be wasted.

36. Bringing up reserve ammunition and issuing it under fire is a difficult operation, and not enough practised. Attention is invited to section 258, *Infantry Training*, 1902.

37. Ranging with trial shots or volleys and observations of fire require a great deal of practice. They must be systematically taught at all field practices. Very few regiments can be said to know much about these subjects.

38. There is one point His Excellency regrets to have to remark on, namely, the tendency at manœuvres to omit carrying out details which no one would think of neglecting when at company instruction or inspection, and the tendency to do things which are absolutely wrong; for instance, omission to use range-finders, an extended line trying to fire volleys, men standing up to fire in a dense mass within

400 or 500 yards of their enemy, sights not adjusted, ammunition mules standing or walking about in the firing-line.

39. While on the subject of manœuvres, Sir Power Palmer considers it is a great mistake to allow a battalion to represent a brigade or anything but what a unit actually is. Doing so means that there are no proper fire units and no fire-control or discipline, and previous instruction suffers in consequence.

40. Another point about manœuvres is, that umpires in giving a decision should not only be guided, as they generally are, by the number of units on each side. No officer should be detailed as an umpire unless he can appreciate the effect of fire at various ranges on troops in all sorts of formations, and how ground and cover affect the result of fire. The force of numbers should be of secondary consideration compared to the way the troops are handled and their methods of working, and the actual and moral support given them by other arms and units, such as covering fire by artillery, the presence of cavalry on the flank, etc. In fact, the general tactical situation is not sufficiently considered. If Colenso had been a sham fight, there is hardly an umpire who would not have made the Boers retire in face of the big British battalions!

41. *Fire-control and Fire-discipline.*—As a rule these are well reported on. Fire-unit commanders are improving in self-reliance and initiative, and the fire-discipline of the men is good, but our fire-tactics generally are still too "sticky" and wanting in elasticity. The following extract from *The Times History of the War in South Africa*, vol. ii., is very interesting, and seems to give an outline of what is required of us :—

"Individual skill with the rifle is not mechanical, as with

the British, but inherent and instructive—no volleys by word of command, no standing or kneeling positions. But it is a mistake to suppose that there was no combined fire-action on the part of the Boers, nothing beyond uncontrolled individual fire. The Boers fully understood the importance of covering the advance of one party of men by the fire of another, or of sweeping a position with a hail of bullets. Careful of ammunition as they usually were, no one could spend it faster when occasion required. One can distinguish three distinct kinds of fire which the Boers used, each appropriate to its own particular phase of an engagement. These were, first of all, the carefully aimed individual fire, in which each shot was fired at some definite person, and only when there was good prospect of hitting him. This was the fire used for all the earlier stages of an attack or defence, and throughout by those who secured perfect cover. Secondly, there was the heavy, continuous fire, directed rather than aimed, which was kept up to cover the last period of an attack, or in the defence to check the rush of a charging enemy. Lastly, and less frequently, there was the snapping fire from the hip or shoulder at close quarters, especially upon a demoralized or retreating enemy—the Boer equivalent, and a very effective one, for the bayonet, whether at the conclusion of a successful attack or at the critical moment when a charging enemy wavered and fell back.

“No less important an element of fire-discipline is the power of holding back fire so as to entice an enemy within a range from which he cannot escape without the heaviest loss. This power of self-restraint is one of the most difficult to ensure in troops. Another characteristic of Boer fire methods was the preference for a flanking fire. Whether in attack or defence, the picked marksmen always took up

positions unobserved, in front of the flanks of their line. While the enemy concentrated all his attention upon the main line and chose his cover to meet their fire, the flankers would pick their men off at leisure."

42. *Range-taking and judging distance.*—In the circular issued last year on the musketry training of the troops, this subject was specially brought to the notice of commanding officers. It is believed that, as far as is possible, all officers and non-commissioned officers are efficient with the mekometer; but with only one instrument in each regiment it is impossible for all those who have been trained to be perfect with it. As is the case with army signalling, a man must be constantly at it to be proficient. If range-takers use the mekometer on service as they do in peace time they will certainly be shot. It is an awkward instrument to use from behind cover in any position but standing, but as long as it is the range-finder of the service, the men using it must be made to do so sensibly.

It is no longer sufficient for only officers and non-commissioned officers to be trained to judge distance by eye. Every soldier must be taught to do so. Instead of having special parades for this purpose, frequent opportunities should be taken, while the men are in extended order, to make them, when lying behind cover, judge the distance of their objectives. The actual distance having been obtained, a few minutes can be usefully spent in explaining how the appearance of the object in question is affected by atmosphere, light, background, etc. By working this into an ordinary subject of instruction, more interest is likely to be taken than if men are turned out for a special parade for judging distance.

EXPERIMENTS.

Besides the instructive accounts of the field-firing carried out in India, the Indian Annual Reports on Musketry give the results of certain experiments that have been made from time to time in various matters relating to rifle-fire. A short account of some of them is given below.

1. *The Rate and Duration of Firing.*—The expenditure of ammunition and the time taken to replace it cannot be fully tested in field-firing on account of the very few rounds per man allotted to this most important part of musketry instruction. In one of the very few reports that contain any adequate mention of ammunition-supply it is stated that it took 27 minutes to obtain ammunition in the firing-line from the time it was sent for. Consequently it is advantageous to know what can be spent in that time.

Experiments, carried out at Meerut in 1897, showed that men could fire continuously, using the rifle as a single-loader, for about half an hour at the rate of 7 rounds a minute, that is 210 rounds in all, without any great inconvenience or damage to the rifle; *accuracy of fire was maintained for about 13 minutes, after which it got somewhat wild*; the rifle got very hot in about 10 minutes, and the beeswax and oil between the stock and the barrel oozed out very freely; the stock and wooden hand-guard also got hot after 10 minutes' firing, and there was a perceptible smell of charred wood, but the rifles suffered no change, and there was no difficulty about loading.

In another experiment the men fired 8 rounds from the magazine in 45 seconds, while others, using the rifle as a single-loader, fired 5 rounds in the same time. When the magazine was only used (that is, refilling it after it was

empty and using it again, and so on) the rate of fire for 7 minutes was 5.6 rounds a minute, while the rifles * used as single-loaders fire 6.8 rounds a minute. Ten cavalrymen fired 50 rounds each in from 5 minutes 23 seconds to 6 minutes 50 seconds at 200 yards at a 6-foot target, and made 473 hits in the 500 rounds.

Thus men can fire at a rate of 5 or 7 rounds a minute and keep it up for about half an hour. If this rate of fire was kept up, it would mean an expenditure of about 200 rounds per man in half an hour, but such a rate of fire would only be used for very short periods of time at critical moments, or else the ammunition carried by each man would very soon be used up.

General Sandford, writing in 1897, said, "I am quite convinced that there must be many cases in which a containing fire must continue to fire for very long periods. As a rule, if this line cannot get forward, it cannot get away, or, at all events, should not be allowed to do so, unless it runs hopelessly out of ammunition, or has to retire on account of darkness, or is swept back by a counter-attack. It would be impossible for any one to guarantee the arrival of the second or assaulting line within 2 or 3 or 15 minutes, however good the original arrangements for its forward movement may have been. And in any case the assault does not usually take place along the whole front, nor is it certain of success, and, under either of these conditions, the containing line, elsewhere than at the point of assault, must continue to fire to aid the advance of the assault or cover its retirement. It may be added that 2 or 3 minutes' continuous

* First using the magazine, and then using the rifle as a single-loader, would give about 10 rounds in one minute, 17 rounds in two minutes, 24 rounds in three minutes, and so on.

fire from infantry, at a time when the artillery of the attack will probably have ceased fire or changed its direction, should be quite insufficient to shake a well-posted, entrenched, and determined defence."

As the control of the firing is in the hands of the company commanders, the foregoing facts show that it will be necessary for them to specially interest themselves in the question of the supply of ammunition in the field, and, as far as may be possible, to control the fire with some regard to the ammunition available.* The physical power of the men for being able to maintain a rapid fire with bayonets fixed, just previous to an assault, will be much curtailed by their previous exertions; but in reality the result will be chiefly decided by the relative moral condition of the opposing forces.

2. *The Advantage of Undersighting when in doubt as to the Range.*—The range was 850 yards. 75 rounds fired by 15 men with the 750 yards' elevation gave 23 hits, while 75 rounds similarly fired with the 950 yards' elevation gave only 10 hits.

3. *The Relative Effects of Volley and Individual Firing.*—Fifty-nine men firing 590 rounds at 600 yards obtained 11·84 hits per man volley firing, as against 15·46 hits per man in individual firing.

Eighty men firing 560 rounds at 400 yards obtained 7·5 hits per man volley firing, as against 15·38 hits per man with 403 rounds individual firing; but the volley firing was made at the rate of 7 rounds per minute, while in the individual firing only 5·37 rounds per minute were fired, showing that very rapid fire is not necessarily as effective as a deliberate fire.

* This subject will be all the more important with clip-loading and automatic-loading rifles.

On another occasion 44,470 rounds were expended at from 1200 to 200 yards, the correct distance at each range being known, and men of different degrees of skill in shooting employed. The results showed that the ratio of hits of individual to volley firing was as 100 to 88, and that the higher ratio was gained in a shorter time. The average hits per minute obtained by individual firing was 81, and by volleys, 63 for ranges of 600 yards and under, and 48 for individual firing, and 13 for volley firing at the longer ranges.

Moreover, changes in objective were quicker made with individual than with volley firing, while there were fewer commands, greater power of concentrating the fire, and less delay in traversing rough ground in the former than in the latter case. There was no practical difference in the amount of dust thrown up in each case by the strike of the bullets. But individual firing requires careful training to accustom the men to stop firing on hearing the whistle.

4. *The Vulnerability of a Company in Line and in Column of Sections.*—At 850 yards the column of sections had about three times as many hits on it as the company in line, but, as some of the bullets must have penetrated more than one of the targets placed in column, we may say that a company in column of sections is twice as vulnerable as a company in line. Consequently, we should always avoid deep, solid formations under effective fire, in which the successive echelons are nearer together than 200 yards at least.

5. *Firing at a Target moving across the Front.*—Range 700 yards, first rank lying down, rear rank kneeling. Men from two different regiments took part in this; one lot of men had been previously practised at such exercises, and the other had not. The result was that the unpractised

men did not know what they could do in the time, and fired more rapidly than they should have done; they fired 800 rounds, and got 59 hits, or a percentage of 7.37. The other lot of trained men only fired 480 rounds, and got 42 hits, or a percentage of 8.75. But here is a case in which the more rapid fire made more actual hits, though with a lower percentage; this may be sometimes advantageous. In this experiment it was found that the men lying down could not follow the target so easily as the men kneeling.

6. *Indirect Firing.*—When the targets and the firing-point were suitably arranged, the results were frequently very good. But a good point for observing the fire in direction as well as in range was found necessary, and also that dust should be thrown up by the strike of the bullets. The firing-point and targets had, however, sometimes to be moved in order to get good results, which is not always practicable in reality.

7. *The Breaching Power of the Rifle.*—Walls built of brick in line can be breached at a range of about 200 yards by a heavy fire directed on the same spot, especially if the joints are more or less thick. Walls built of sun-dried bricks, set in mud, can be similarly breached. But mud walls, if at all damp, are only penetrated without much other damage being effected.

8. *Night-firing.*—A large number of experiments have been devoted to night-firing under different conditions, such as, with improvised rests, luminous or white tapes, electric and Bengal lights, and star-shell fired by artillery.

The improvised rests, prepared by daylight, and notched so as to give the correct elevation and direction on targets representing a ford, a bridge, a defile, or a breach requiring repair, always gave very good results whenever the rests

were solidly constructed and the notches did not allow of any free play. The rests were made out of logs, sleepers, forked sticks, stones and planks on edge held in place by tent-pegs.

Luminous tapes and white tapes tied over the sights frequently gave good results when the range was known, but, owing to the fulness of the foresight that had to be used, the fire was apt to be high, unless the backsight elevation was kept correspondingly low.

The use of the ordinary sights (without being covered with tapes), but with the direction of the fire being marked out on the ground with tapes, was not satisfactory. On one occasion white paper was pasted on the rifle-barrels, but produced no particular beneficial results. But when mechanical arrangements (with planks, etc.) were made to keep the ground in front swept by a grazing fire under six feet from the ground, very high results were often obtained. The upper part of parapets should always be sloped so as to allow of this.

When the electric light was used the targets were floating in water, and the electric light was in the firing-line. Ranges 600 and 400 yards. The men could aim fairly well as the foresights showed up against the targets, but they took longer to aim than in daylight, and had to use the 400 yards' elevation for the 600 yards' range, and the 300 yards' elevation for the 400 yards' range, owing to the greater amount of foresight that had to be used. The splash of the bullets on the water was plainly seen. The result was satisfactory.

Bengal lights and bonfires saturated with kerosene oil were lit by electricity from the firing-point on ground supposed to be crossed by an advancing enemy. Satisfactory results were obtained, but the difficulty in war time

would be to know when to light them up, and there is the possibility of failure in igniting the lights.

To get satisfactory results with the use of star-shell several conditions are necessary. In the first place, there should be a sufficient number of guns firing to keep up such a succession of star-shells as will continuously light up the enemy, a high elevation must be used, and shells burst high over the targets; hence star-shells are hard to use at the short ranges of 500 yards and under. The light given is not sufficient for the rifle-sights to be used, so there is no use attempting to fire at too long ranges. Owing to the impossibility of using star-shells at short ranges, they must, at those ranges, be burst behind the objective, so as to form a background for them to stand out against, but otherwise it appears best to burst them well in front of the target and well up in the air. Stars burning on the ground do not give much light, and are easily extinguished, and they give no light at all if they fall into dense brush-wood or rough ground. The star-shell should be so opportunely fired in succession as to keep up a continuous light, and to do this they should be prepared beforehand, because the boring and fixing of the fuses cannot be readily done in the dark. On one occasion four shells fired in succession gave a good continuous light for one and a half minutes in all.

APPENDIX IV

NOTES ON GERMAN MUSKETRY TRAINING

ONE of the most marked characteristics of the German Musketry Regulations is the importance attached to fixing in the minds of the men the elementary principles of firing, and to encouraging them to obtain results without much difficulty. The principle on which the programmes for recruits and for trained soldiers are drawn up is that fire at short ranges is much the most instructive, and is sufficient to raise the skill of the men in firing to its highest development. The greater part of the firing exercises are accordingly carried out at short ranges; each of the ranges of 400, 500, and 600 metres is only fired over once, the men—either kneeling or lying down, and even firing from a support at 600 metres—being only allowed to fire in the most favourable conditions. So much importance is attached to this last point that the regulations formally forbid range practices when the atmospheric conditions are bad for good shooting.

The first part of the annual course of fire, or the school-firing, as it is called, takes up the greater part of the annual exercises, and the greatest care is taken in carrying it out, the men only firing one at a time, and in the presence of one of the company officers. As this procedure

requires much time, only small detachments of about twelve men each are sent at the same time to the range, in order to avoid long delays, that only weary the men and make them take a dislike to musketry; and for the same reason not more than six rounds per man are allowed to be fired at each exercise. The object of this constant practice in school-firing is to make the men good shots up to 600 metres (650 yards). This result is greatly facilitated by the fact that every regiment of infantry (that is, a fixed group of three battalions) has its own special range, allowing of rifle-fire up to 600 metres.

The second part of the annual musketry course comprises field-firing (battle-firing) in varied ground. Its object is to give the men an idea of the conditions under which rifle-fire is carried out in war, that is to say, over varied ground and at unknown distances. The German Regulations say, "Battle-firing is the final object of all instruction in firing; it constitutes the essential part of it." A description of the provision that actually existed in 1897 in Germany for the instruction of the troops in field-firing will show far better than any mere words the capital importance that the Germans attach to field-firing.

After the adoption of the Mauser rifle, and the advances made in the musketry instruction of the infantry, and in the study of the effects of rifle-fire, the necessity for practising troops in the execution of field-firing, under conditions approaching as nearly as possible to those of war, was recognized. To give this instruction, the Germans at first made use of the firing-grounds that their artillery already possessed, and, beginning in 1883, very large sums were annually voted by their Parliament both to augment the somewhat limited dimensions of these firing-grounds

and to establish new ones. It was in this way that the firing-grounds at Haguenau, Lockstadt, Zeithain, Griesheim (Darmstadt), Jüterbog, Tegel, Falkenberg, and Wahn were greatly extended, and those of Gruppe, Hammerstein, and Altenberg were brought into existence.

At the same time, in order to diminish the burden imposed on the adjoining populations by the billeting on them of the successive batches of troops, who followed each other to the firing-grounds almost without interruption during a good part of the year, the German War Office considerably increased the existing barrack accommodation on the firing-grounds, and built new barracks where none existed. When sufficient funds were not forthcoming for the immediate construction of permanent barracks, only such works (*e.g.* cook-houses, magazines, latrines, water-supply, washing-places, roads, etc.) were first undertaken as were indispensable for the periodic establishment of camps with troops under canvas. In 1891 the whole of the money spent since 1881 on enlarging the firing-grounds, and in preparing them for troops as stated, amounted to £1,050,152.

On account of accidents arising from the greater range of the new rifle adopted in 1888, the need for still more extensive firing-grounds than those which then existed was recognized. But other influences were also acting in the same direction, namely, the increasing importance of field manœuvres for large units composed of all arms, with or without the accompaniment of field-firing; the dislike of the higher commanders at having to wait until the period of the autumn manœuvres in order to complete the instruction of their troops for war; and the desire to avoid the periodic payment of high indemnities in payment of damages caused during the course of field-firing exercises.

Such were the motives that have induced the German War Office, since 1891, to establish a number of sufficiently extensive manœuvre-grounds, where field-firing and manœuvres over varied ground could be undertaken by all arms, either separately or combined, at all seasons of the year, and without having to consider agricultural interests. Chosen as much as possible in sparsely populated regions, and where the soil is of relatively small value, these manœuvre-grounds ought, in order to fulfil their object, (1) to be situated in more or less central positions as regards the garrisons who have to make use of them; (2) to permit of the fire of infantry and artillery in several directions; (3) to have sufficiently large dimensions to enable large units composed of all three arms to be massed and manœuvred on them; and (4) to present a sufficient variety in the accidents of the ground to represent the ordinary conditions of war to the troops, and that without preventing the movements and employment of cavalry. Their theoretical extent was fixed at 21·8 square miles, or about 4·67 miles a side, but at the outset only one manœuvre-ground, that of Lockstadt, approximately reached those dimensions.

The artillery firing-grounds, which best responded to the conditions laid down, were the first to be transformed into manœuvre-grounds by the gradual extension of their area and barrack accommodation. At the same time, some new manœuvre-grounds were established in those regions where the existing firing-grounds could not be easily extended. At these places, either permanent barracks or the permanent requirements for standing camps were constructed. In this way the firing-grounds of Haguenau, Jüterbog, Arys, Wesel, and Darmstadt were changed, in 1891, into manœuvre-grounds, and in the same year a

first approximation of £140,000 was voted for the creation of a manœuvre-ground at Senne for the eastern garrisons of the VII. Corps.

Since 1891 the Germans have continued spending large sums each year on the creation, enlarging, and preparation of manœuvre and artillery firing-grounds. From 1892-93 to 1895-96 they successively established the following manœuvre-grounds :—

Munster (X. Corps)	...	...	...	1892-93
Döberitz (Guard)	...	...
Hammelburg (II. Bavarian Corps)			}	1893-94
Elsenborg (Malmedy) (VIII. Corps)				
Loburg (IV. Corps)	...	...	...	1894-95
Munsingen (XIII. Corps)	...	...	...	1895-96

The artillery firing-ground at Zeithain was also greatly enlarged and converted into a manœuvre-ground for the XII. Corps in 1895-96 ; and a similar transformation was provided for that at Lockstadt for the IX. Corps in the budget for 1896-97.* Also special artillery firing-grounds for garrison artillery were established in 1894-95, one at Wahn for the western part of the Empire, and the other at Thorn for the eastern part.

Thus in 1896-97 Germany possessed 14 manœuvre-grounds, and 2 garrison artillery firing-grounds, exclusive of the field artillery firing-grounds, not yet transformed into manœuvre-grounds. These 14 manœuvre-grounds are as follows :—

* The writer has not been able to get the statistics for the subsequent years.

Corps.	Place.	Greatest dimension in miles.	Area in square miles.
I.	Arys	4.97 × 1.86	7.24
III.	Jüterbog	5.59 × 2.49	11.37
IV.	Loburg	(?)	(?)
VII.	Wesel, Senne	3.73 × 3.73	14.52
VIII.	Elsenb.orr.	4.35 × 3.73	16.76
IX.	Lockstadt	(?)	21.72
X.	Munster	4.35 × 4.35	18.92
XI.	Darmstadt	(?)	(?)
XII.	Zeithain	4.35 × 3.11	12.74
XIII.	Munsingen	4.35 × 3.73	13.51
XV.	Haguenau	2.49 × 1.24	2.78
Guard	Döberitz	4.35 × 3.73	16.22
I. Bavarian	Lockfeld	(?)	(?)
II. Bavarian	Hammelburg	(?)	(?)

Thus in 1897 the II., V., VI., XVI., and XVII. Corps had no manœuvre-grounds of their own, and had consequently to make use of the manœuvre and firing grounds of the neighbouring corps. On the other hand, many of the manœuvre-grounds have not yet reached their complete development as regards either superficial area or accommodation. The sums voted from 1891-92 to 1895-96 for these purposes amounted to £2,410,480, and the budget for 1896-97 provided for a further grant of £446,950; and an additional sum of £3,507,430 was needed to make a complete provision for all the German corps. Branch lines of railway are being laid wherever the manœuvre-grounds are any distance from a railway both to save loss of time in getting troops to the grounds and to facilitate their supply.

The number and extent of the firing and manœuvre grounds, as well as the large sums that are voted yearly for them, give an idea of the importance that the Germans attach to field-firing, and that they should be used for this

purpose at all seasons of every year for the manœuvre of regiments, brigades, and divisions, as well as of forces of all three arms—it being rightly considered that in this way they will obtain the best possible school for the tactical instruction of their officers and the manœuvring aptitude of their troops. Even a very slight study of the German infantry regulations will show us what a constant, and even absorbing, preoccupation the Germans have for securing the preponderance in action of rifle-fire, combined with a violent offensive forward movement. Theoretically these tactical proceedings and methods of instruction are almost solely concerned with the view of obtaining the superiority of the fire, which the Germans consider to be the chief guarantee of success. Practically, we find the same thing in the scrupulous care they devote to musketry instruction in order to get the best results possible from their fire; in the flexibility of their formations, and the rapidity with which they are taken up, by means of which they hope to be able to surprise the enemy; and in the immense firing-grounds and extensive manœuvre areas of Arys, Jüterbog, Elsenborn, Döberitz, etc., which are veritable schools for war, and for the provision of which they have not recoiled from any sacrifice. They consider that success belongs beforehand to those who possess the best musketry instruction, the most severe fire-discipline, and the best-managed direction of the fire.

We may not agree with the dense firing-lines made use of in the German Army and the still denser formations laid down for their supports, after our South African experience—and, indeed, the Germans do not altogether adhere to them—but we cannot but help admiring the thoroughness and consistency with which they put their guiding principles into practice. Furthermore, there is

much in their instructional and tactical methods that we can copy with advantage. But in doing this we must be careful not to copy the mere outward forms of German practice, as we have so often done, without bearing in mind the preparation they have made for the application of these forms. The high cost of land in Great Britain, the idea that shooting game is of more importance than giving the best training possible to our men to uphold their country's honour and policy, the grudging way in which money is doled out in peace time for military training for fear of party political capital being made out of it, etc., are so many various factors that have prevented our Army having neither the use, even on payment, of the country for manœuvring over in large masses once a year for field-firing on a suitable scale, nor the proper provision of ordinary ranges near at hand to our barracks. The result is that, as the bulk of our troops cannot get *daily* access to convenient ranges, the annual musketry practices for each company are got through in a few days, in any weather, while for the rest of the year no ball-firing takes place, unless some lucky general can manage to get one day's field-firing in some country out of Great Britain. What is often practised under the name of "field-firing" is an utter misnomer, because true "field" conditions are absent. But in India and in South Africa, where a very considerable portion of our troops will probably be stationed in the future, for political and strategical reasons,* we

* The following letter, which appeared in the *Times* of April 19, 1901, is of interest in this matter:—

SOUTH AFRICA AS A TRAINING-GROUND FOR TROOPS.

SIR,—Mr. Winston Churchill's lecture and the remarks of Sir Redvers Buller, who presided at it, bring one fact into marked relief,

have very great possibilities for the proper training of our troops, and all that is needed is the purchase of sufficiently large areas of suitable land, while in Great Britain a "Manœuvre Act" is urgently needed, giving the use of a wide tract of country, once a year, for the manœuvring of our troops at home in large masses under war conditions.

But in spite of all the disadvantages under which our Army has to be trained, our small company organization, combined with the zeal and energy of our officers, have

viz., that many defects in British military training are attributable to the British Army having no proper training-ground on which to prepare armies for war. This country will now have such a training-ground, vast and varied, such as no Western European power possesses. South Africa will supply us with a new manœuvre territory in which we can find a fresh area for tactical training each year for a quarter of a century. To use it as such will effect two important benefits, apart altogether from the military advantages of the training. It will keep before the inhabitants a proof of the military resources of Great Britain, and it will bring a great deal of money into the pockets of a people whose sole road to prosperity is that of supplying food for man and beast. Some indication has been current in the form of rumour that the future military forces in South Africa are to be limited to a few garrison battalions and a military police, a repetition of the policy which led to the revolt of 1881 and our disastrous surrender. Both from a South African point of view and from an Imperial point of view, it is earnestly to be hoped that this will not be the case. It is a tactical principle that where two important points some distance apart have to be defended, the reserves should be kept at a point equidistant from both. The British Empire is like a tactical terrain, the two great points to be guarded being these islands and our Indian dominions. South Africa is at about equal distance from both, and a large force there, obtaining the highest training possible in a healthy climate, would be of incalculable value to the Empire's safety.

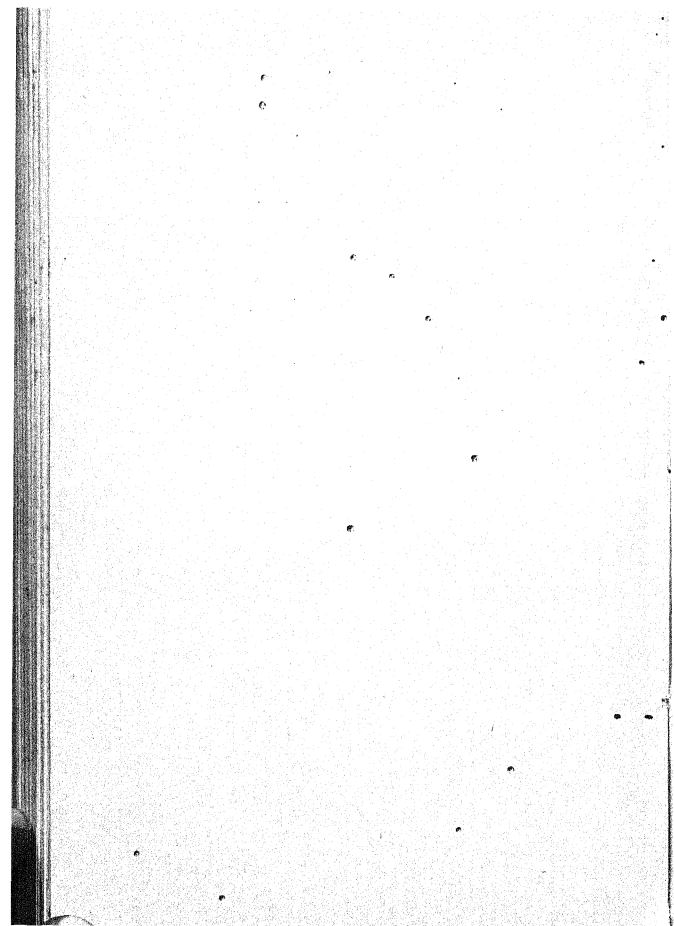
I am, etc.,

J. H. A. MACDONALD.

April 18.

always enabled our troops to give a good account of themselves in war, though at the cost of a voluntary noble sacrifice of life that might have been rendered unnecessary under better conditions; indeed, our Army has a high amount of efficiency out of all proportion to the small advantages offered to them for this purpose. No doubt, our national love of games, and especially of games that need endurance and courage, and that have an element of danger in them, and which train men to "play together," has given the necessary basis on which our officers have been able to build so successfully. But the very conditions and limitations of our training render it necessary for us to be most careful in blindly following the German principle of "free" tactical procedure, as so many hold up as the one ideal of battle. In Germany it has been preached by pen and tongue, but in practice, with the thorough and continuous practice that German officers and men undergo, the resulting tactical procedure is not so very free as one is apt to consider; they have, in fact, become more or less cast in definite moulds from the fact that their troops always serve together and are always under the same leaders in peace and in war. But even with all these advantages the inherent dangers of a free tactical procedure have so strongly shown themselves in the German annual manoeuvres, that, in Germany itself, its advocates are fast losing ground. The Germans have adopted the principle of "organized battle-fields," and this is rapidly leading them back again to a definite and recognized normal initial battle organization for all units, capable, however, of being modified to suit any special and abnormal local circumstances. And if this necessity for a return to the older ideas is being found necessary for the German Army, with all its enormous advantages for training, and which is daily

gaining ground rapidly among them, judging by the military papers of the day, much more necessary is this necessity for our own Army, with its very limited advantages for proper tactical and strategical training.



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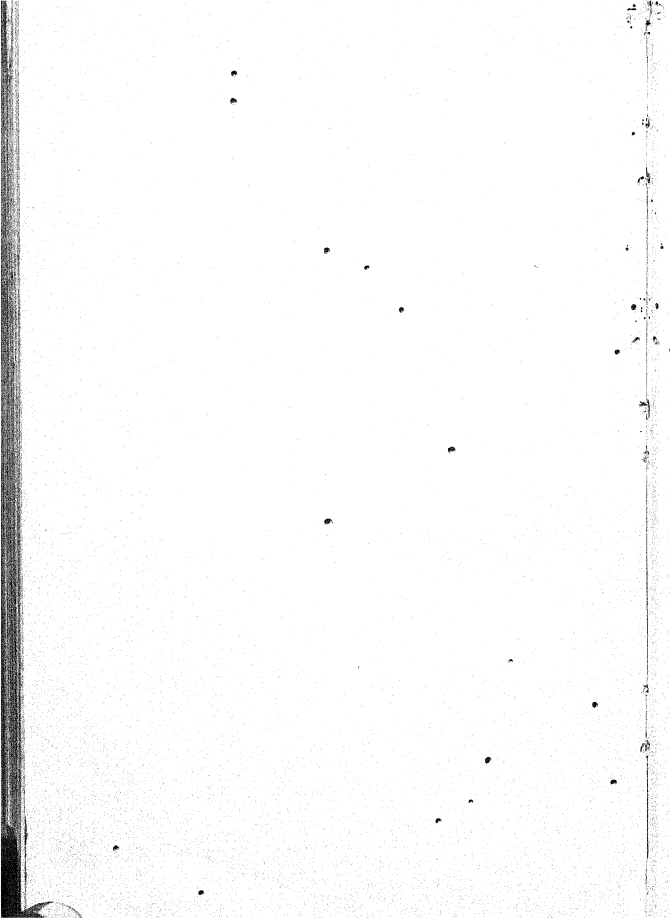
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